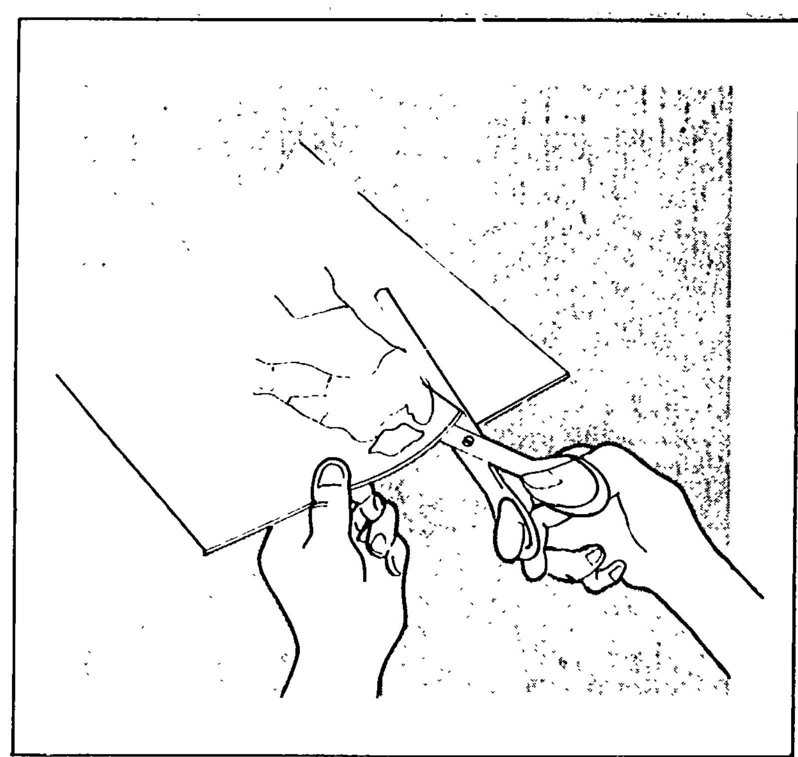
ASIAN PROGRAMME OF EDUCATIONAL INNOVATION FOR DEVELOPMENT 

LOW - COST EDUCATIONAL MATERIALS

How to make
How to use
How to adapt



INVENTORY
Volume I



UNESCO REGIONAL OFFICE FOR EDUCATION IN ASIA AND OCEANIA
Bangkok, 1980

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INTRODUCTION

In the Asia and Oceania region, the scarcity of resources is increasingly recognized as an important impediment in extending opportunities for education and improving its quality.

Consequently, there is a distinct trend and determined effort in the region to utilize low-cost, simple and indigenous materials which include, among others, hand-made educational charts, maps, models, improvised science apparatus, kits, educational toys and games for children.

In planning the activities in the area of educational technology under the Asian Programme of Educational Innovation for Development (APEID), attention has been focused on a systematic approach to reviewing the current efforts and products, and exploring new strategies and directions in designing low-cost/simple educational materials, using the environment and mobilizing unused and under-utilized local resources, with a view to ensuring effective implementation of educational programmes supportive of the national development goals.

In December 1977, the Regional Workshop on Educational Technology with special reference to the development of low-cost educational materials was organized in Kuala Lumpur under the joint sponsorship of the Curriculum Development Centre of Malaysia and the Asian Centre of Educational Innovation for Development (ACEID), a unit of the Unesco Regional Office for Education in Asia and Oceania. Twenty-three participants from thirteen countries exchanged experiences in the development of educational materials and considered the use of the environment and locally available materials and other appropriate or adapted methods and techniques being used and developed in the region. The Workshop prepared guidelines for designing, developing and evaluating low-cost educational materials, and made proposals for re-orientation and strengthening of national efforts.

The Fifth Regional Consultation Meeting on APEID (Bangkok, 21-30 March, 1978) endorsed the scheduling and sequencing of the activities relating to the development of low-cost and indigenous teaching devices and materials based on cost-effective techniques. It recommended that prior to holding the first Sub-Regional Workshop, a series of National Workshops should be organized in the countries participating in the Sub-Regional Workshop.

The National Workshops were held during the period between August and October 1978 in seven countries. One of the main outcomes of these National Workshops was the inventories of low-cost/simple materials developed in the countries.

The experiences gained and collected in the National Workshops were brought together for exchange at the Sub-Regional Workshop in Educational Technology held in Kathmandu, Nepal, from 7-12 November, 1978. Sixteen participants (two each from Afghanistan, India, Japan, Malaysia, Pakistan and Philippines, and four from Nepal) developed exemplar low-cost/simple materials together with their instructional sheets for use in training institutions, and by supervisors and teachers.

Additional exemplar materials were prepared, under contract, by national specialists in the region.

All the materials prepared by the Kuala Lumpur Regional Workshop (1977), the National Workshops and the Kathmandu Sub-Regional Workshop (1978) were collected, out of which eighty-five items have been selected and published in this Inventory. Additional items will be published in subsequent volumes.

ACEID welcomes comments on the Inventory, and contributions for possible inclusion in the subsequent volumes of the Inventory.

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SHEET 1

FLIP CHART (MAPS)

1. BRIEF DESCRIPTION

Maps showing different components of a country are made from a used calendar with six sheets (calendar up to three sheets can be used for the purpose). A cheap sheet of white paper is mounted over each sheet with glue. After tracing out the boundary-line from a suitable map over it, needed details are written, by refering to a related text-book.

2. OBJECTIVES

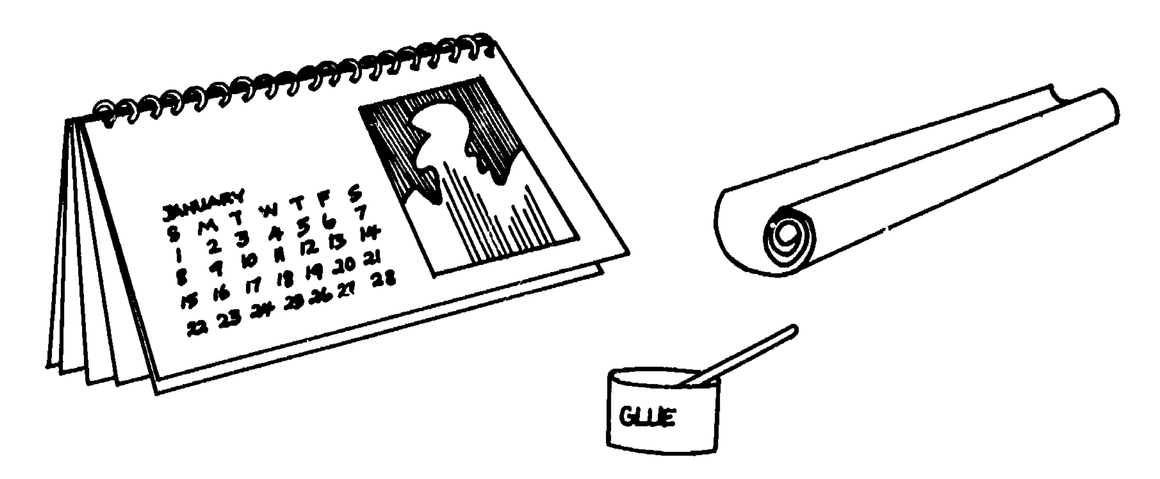
1. To acquaint the users with the general physical shape of a country;
2. To acquaint the users with different features of a country like mineral resources, modes of transport and communications, and geographical features;
3. To explore possible uses of similar low-cost flip charts in other areas.

3. MATERIALS USED

A spiral-bound used calendar with six pages; a few sheets of cheap white paper; a few used carbon sheets; a discarded ball point; writing instruments; glue or any adhesive material; a resource map.

4. HOW TO MAKE

1. Sheets of paper, equal to the number of sheets from the calendar are cut to fit in the total area of calendar sheet.
2. Sheets of white paper are amounted over the calendar sheets with an adhesive material.



3. The reference map is placed over the calendar sheet and a carbon sheet in between them.
4. Pressing of boundary-lines and important marks are done by the discarded ball-point.
5. Tracing of outline map in each sheet is completed.
6. The lines are boldened/thickened by a thick writing material.
7. Topics to be titled and included in each sheet are decided in the following order:

   Sheet 1. Political division, the capital city, zonal towns, etc.

   Sheet 2. Geographical features – the rivers, mountain peaks, towns, etc.

   Sheet 3. Mineral resources (by different signs like squares, tringles etc.)

Sheet 4. Airports/routes, railways, roads, seaports, etc.

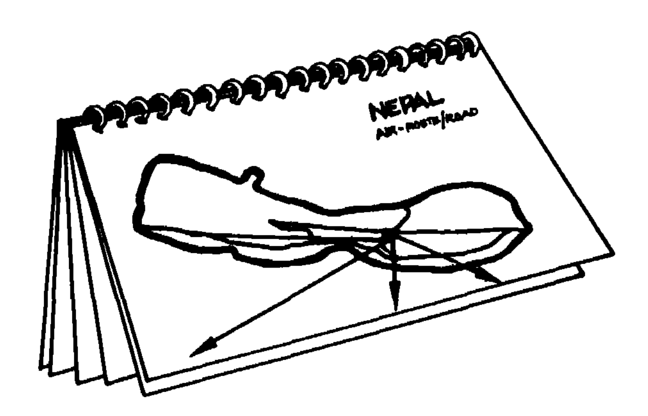
Sheet 5. Location of density of population (by number of small circles).

Sheet 6. Ethnic groups (by number of different signs).

8. Details are filled in the maps with the aid of a related text-book by a bold writing material.

5. HOW TO USE

The teacher may use the flip-chart as a cheap but very handy source of teaching-aid. He would use it by turning over each sheet – demonstrating and explaining the contents in each lesson. Besides, the teacher can also encourage the pupils to make a similar chart of their own at home.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys" prepared by Mr. M. Chitrakar, Janak Educational Material Centre, Nepal.*

SHEET 2

MAKING A MAP PRINTING DEVICE FROM AN EMPTY CAN

1. OBJECTIVE

To make a map printer from a discarded can.

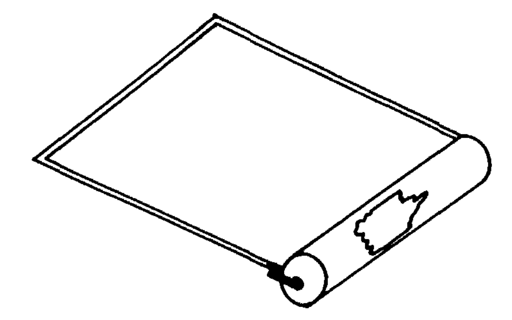
2. MATERIALS USED

Paper, pen, glue, ink, strip of wood (1 x 2 x 30 cm) and two nails.

3. HOW TO MAKE

1. Copy the map of a country on a sheet of paper, in which the size is equal to the entire cylindrical surface area of the can. Glue the paper onto it.
2. Following the contours of the map, glue a thick cotton thread onto the paper. Let it dry.
3. Use two nails to fasten the two ends of the wood-strip to the two ends of the can. See figure below.
4. Spread ink on a small flat area. Roll the device on the ink. After enough ink has been absorbed by the cotton thread, roll the printer over a piece of paper and the map is copied.

NOTE: By this method, printed maps can be produced fast and inexpensively.



Source: *"A report of the National Workshop in Educational Technology: 21-26 October 1978," National Science Centre, Afghanistan.*

SHEET 3

SIMPLE PRINTING MACHINE

1. BRIEF DESCRIPTION

A simple tool for printing, using the 'silk screen' principle. Prints are made by a typing stencil with the help of a jar and blotting paper. (Figure 1)

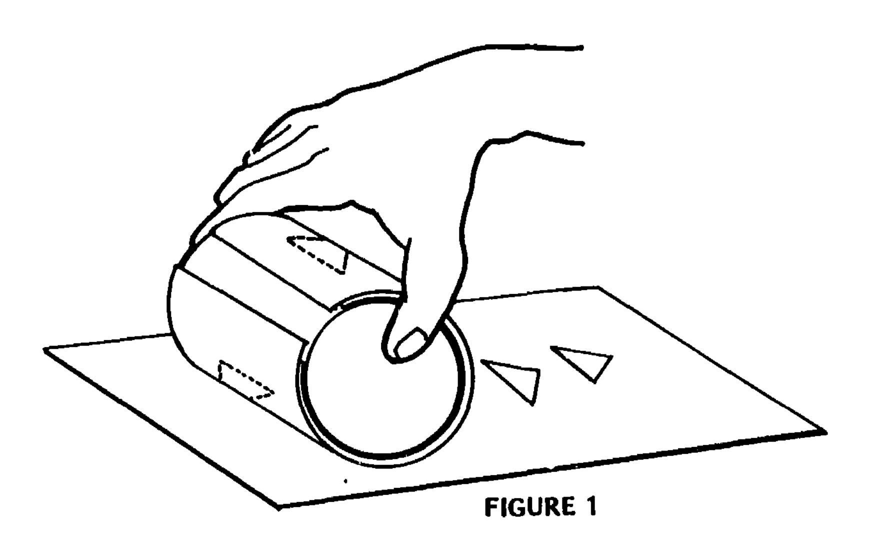


FIGURE 1

2. MATERIALS NEEDED

Blotting paper   Typing stencil   Bottle or jar   Printing ink

3. HOW TO MAKE

1. Cut out a piece of stencil about two inches or 5 cm longer than the paper on which you wish to print.
2. Draw the desired figure on the stencil, using a stylus or fine ball-point pen. (Figure 2) Make sure that the etching of the stencil is firm by looking through it toward a light source.

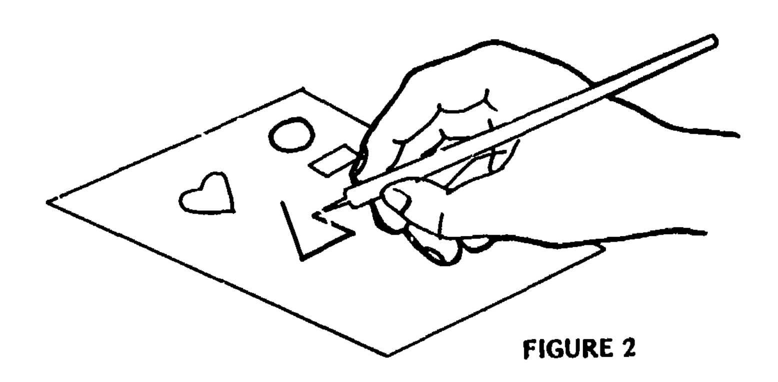


FIGURE 2

3. Squeeze some ink on the top of the stencil, covering all parts of the drawing (Figure 3).

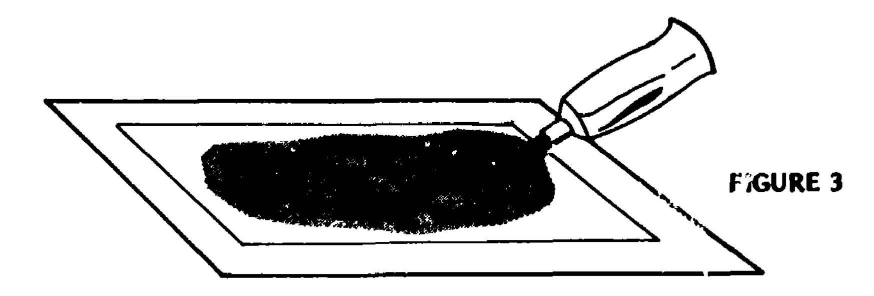


FIGURE 3

4. Place a piece of blotting paper the same size as the stencil on top of the ink (Figure 4).

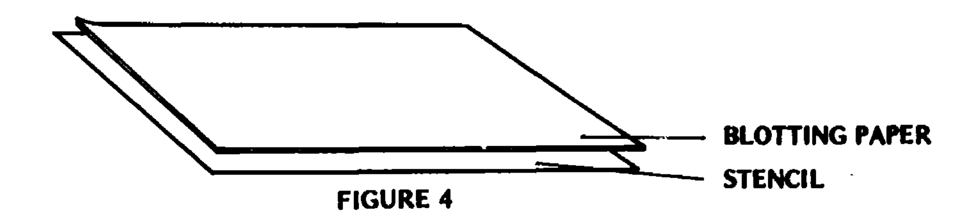


FIGURE 4

5. Invert the blotting paper and stencil and wrap both around the jar or bottle, with the blotter against its surface. Tape the ends to the glass or plastic (Figure 5).

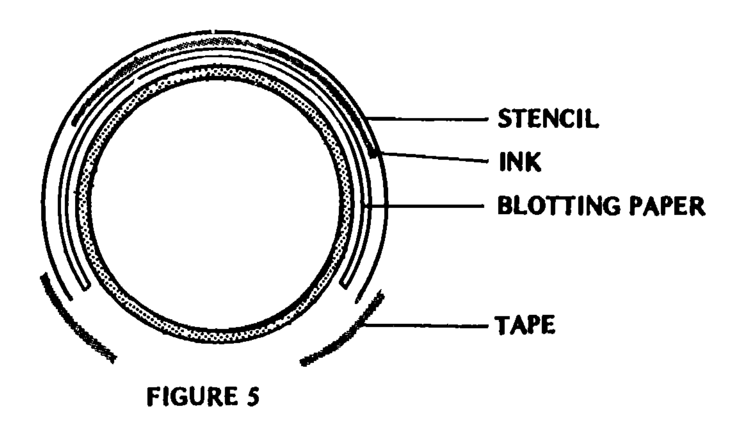


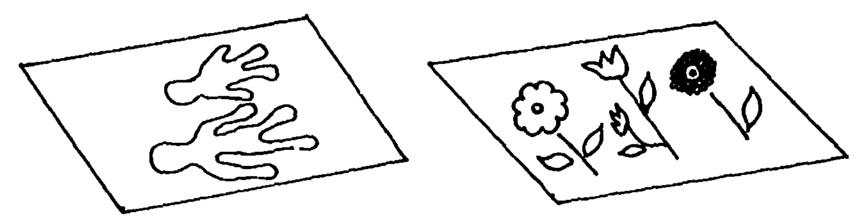
FIGURE 5

6. To print, roll the stencil on the sheet on which the figure is to be printed, as in Figure 1.

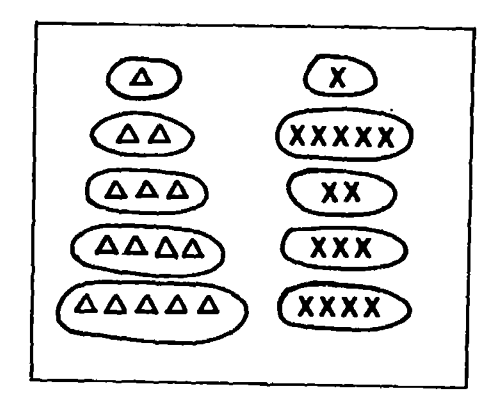
4. HOW TO USE

This simple device will print any line drawing or pattern.

1. Charts or drawings

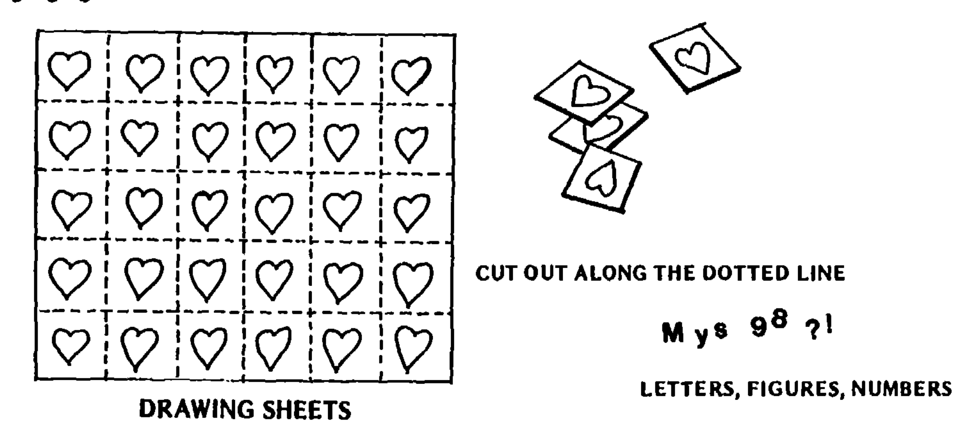


2. A chart for matching sets



DRAWING SHEETS

3. Pictures for language games



DRAWING SHEETS

5. MODIFICATIONS

Coloured pictures may be produced by using coloured printing inks.

Also remember that the figures can be printed onto a wide variety of materials, such as card, plastic, cloth and transparencies.

Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7 – 21 November, 1978.*

SHEET 4

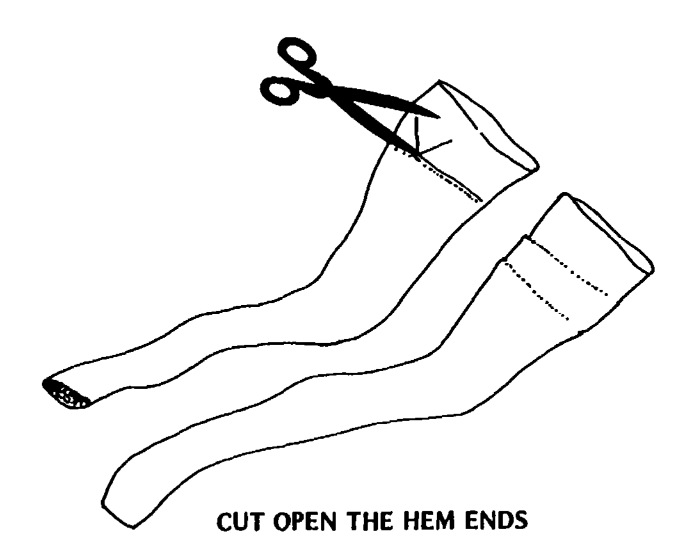
NYLON STOCKINGS FOR ADHESIVE BOARD

1. BRIEF DESCRIPTION

Discarded ladies' nylon stockings can be arranged and stitched together for an effective background of an adhesive board just like other fabrics which are commonly used for the versatile flannel board.

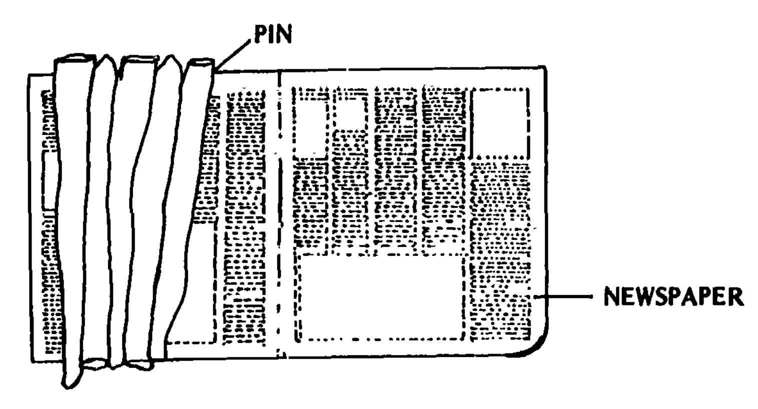
2. HOW TO MAKE

1. Select discarded ladies' nylon stockings which are long and of similar or monochromatic shades. Cut open the hems at the upper ends in order to give more length to the finished sheet.



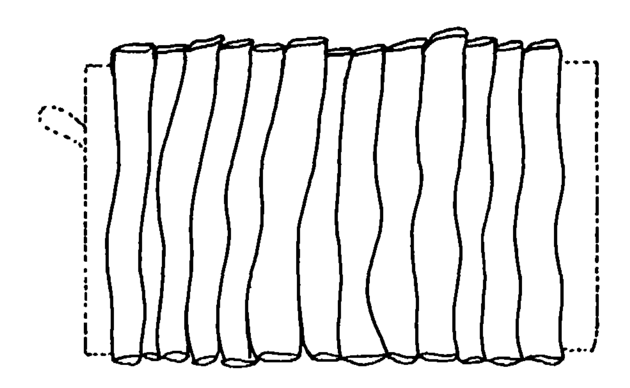
CUT OPEN THE HEM ENDS

2. Place the stockings in such a way that the hem-ends and the sole-ends are arranged alternately and the pieces overlap each other. Pin the pieces on a large old newspaper.



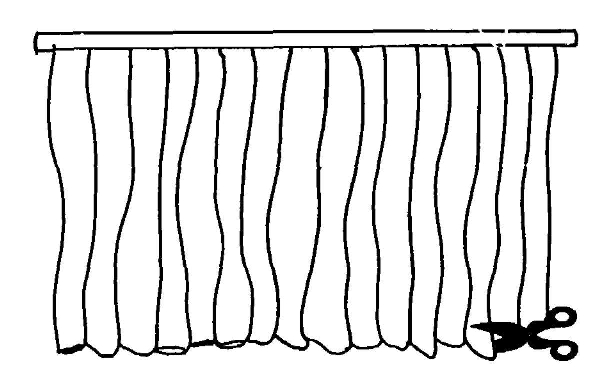
OVERLAP AND PIN THE STOCKINGS ON AN OLD NEWSPAPER

3. The arranged stockings are now ready for stitching together on the sewing machine or by hand with running stitches.



STITCH TOGETHER THE ARRANGED NYLON STOCKINGS

4. The ends of the stitched stockings should be trimmed straight and the edges finished with a binding of joined nylon stockings or bias tape or any desired binding material.



TRIM STRAIGHT ALL EDGES AND FINISH WITH BINDING TAPE

5. The finished sheet is now ready for use with cutouts backed with medium grain sandpaper.

Source: *A paper entitled "Nylon Stockings for Adhesive Board" presented by Miss S.P. Navarro, Philippines, at the APEID Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, 5 - 15 December, 1977, Malaysia.*

SHEET 5

ADHESIVE BOARD

1. BRIEF DESCRIPTION

The flannel board can be made from any kind of wooden stand and used jute bags.

2. OBJECTIVE

To help in the demonstration of visual aids to children.

3. MATERIALS AND TOOLS NEEDED

Any kind of wooden draining board on stand made with slots, used jute bag, some nails, plenty of fine sandpaper, a saw, a hammer, a stapler, a plane, pieces of wood to make a frame.

4. HOW TO MAKE

1. Smooth the surface of the wooden stand with a plane (Figure 1).

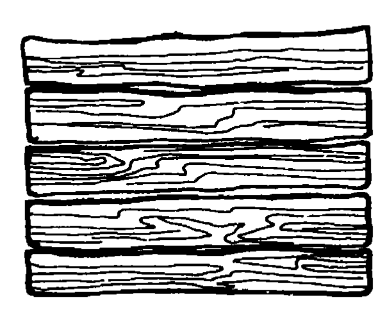


FIGURE 1
FLUTED WOODEN DRAINING BOARD OR STAND

2. Take an old jute bag wide enough to cover the surface of the board. Lay it down over the board (Figures 2 and 3).

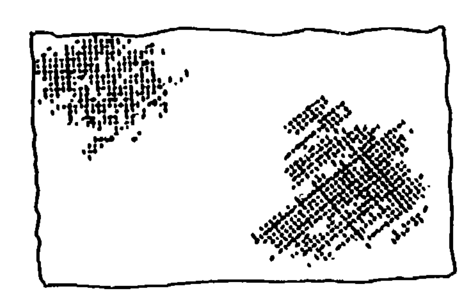


FIGURE 2
JUTE BAG WIDE ENOUGH TO COVER SURFACE OF THE BOARD

3. Secure the jute bag over the board with nails.

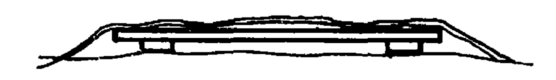


FIGURE 3
LAY JUTE BAG OVER THE BOARD

4. Reinforce with staples every ten cms. (Figure 4).



FIGURE 4
HAMMER AND STAPLE THE JUTE BAG OVER THE BOARD

5. Finally, nail a wooden frame around the board. (Figures 5 and 6).



FIGURE 5
SIDE VIEW OF THE FLANNEL BOARD

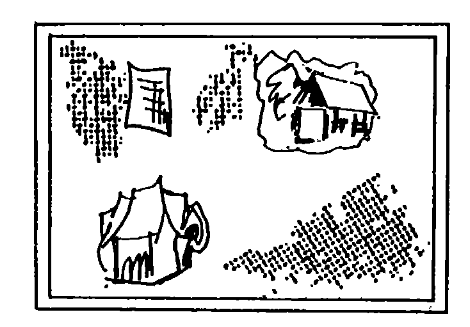


FIGURE 6
WOODEN FRAME AROUND THE BOARD

5. HOW TO USE

All kinds of pictures or other visual aids can be made to stick to the board for display purposes. Simply cut the pictures as required, and paste fine sandpaper to the backs of the cut-outs.

6. MODIFICATIONS

Bamboo strips may take the place of wooden slats to make the surface of the board. Instead of a jute bag, other kinds of material such as used woollen blanket and flannel cloth may also serve the purpose.

Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 6

LETTERS AND NUMBERS GAME

1. BRIEF DESCRIPTION

Letters of the Roman Alphabet are painted on one side of the soft drink bottle caps and their corresponding numbers on the opposite side.

2. OBJECTIVES

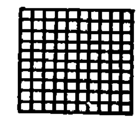
1. To help children beginning to learn English gain mastery in recognizing the letters of the alphabet.
2. To drill or review through games the spelling of words learnt in previous lessons.
3. To help children count, add and subtract two to three digit numbers.

3. MATERIALS NEEDED

Soft drink bottle caps, paint, brushes and cardboard.

4. HOW TO MAKE

1. Paint the bottle caps. Let them dry.
2. Paint the letters of the Roman Alphabet on one side and their corresponding numbers on the opposite side. Paint more vowels particularly A and E.
3. Prepare a chess-like-board composed of one hundred 1" squares on cardboard or plywood.



If there are enough bottle caps, it is best to prepare a chess-like-board and a set of alphabets for each child in the class. There should be at least five or more bottle caps to a vowel (more on A and E) and three or four caps to the commonly used consonants. X, Q and Z may have one cap each.

5. HOW TO USE

A. Objectives 1 – for children just beginning to learn English:

1. Provide each child with a set of the Roman Alphabets.
2. Shuffle all letters on the desk.
3. Each child picks up and shows the alphabet called out by teacher at random.
4. Child shakes all letters in a box, picks out one and identifies it.
5. Children classify the letters and put them back in their proper compartments.
6. The same is done with numbers.

B. Objective 2 – for children of higher level:

1. Provide each child with a board and a set of the Roman Alphabets.
2. Shuffle all letters on the desk.
3. Call out a word and ask children to spell it on their board.

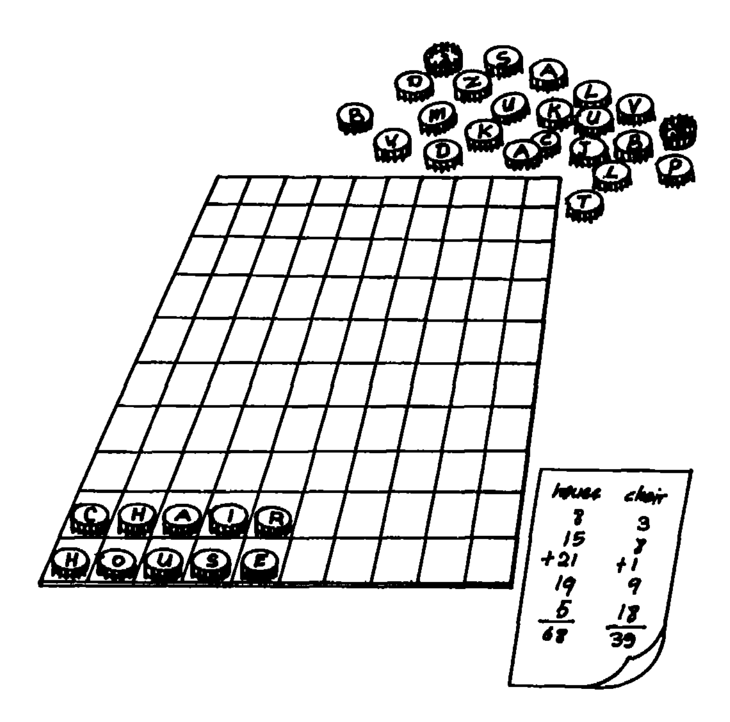
Variation:

1. Divide class into teams.
2. Shuffle all bottle caps and divide equally among the teams.

3. Ask teams to form nouns/verbs/adjectives from their given letters.
4. Words spelt correctly are recorded. Scores are taken from the corresponding numbers found at the back of the letters.
5. Game ends when all letters have been used or no more words can be formed.
6. Players count and add their scores.
7. The corresponding numbers of the unused letters are likewise added and subtracted from the scores gained.
8. Overall winner is determined by the highest score gained by a team.

6. MODIFICATION

1. Schools situated near the beach may use shells or peebles instead of soft drink bottle caps.
2. The game can be modified and adapted for use in other subject areas.



Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 7

COLOUR MATCHING BOX

1. BRIEF DESCRIPTION

The colour matching box is one of the least expensive educational materials produced in the Workshop. This is because a discarded cardboard container was turned into a useful material for developing concepts of colors, sizes, shapes and numbers.

2. OBJECTIVES

1. To develop simple concepts related to a child's everyday life, such as:
   - colour concept
   - concept of sizes and shapes
   - concept of numbers
2. To find other possible uses of the colour matching box.

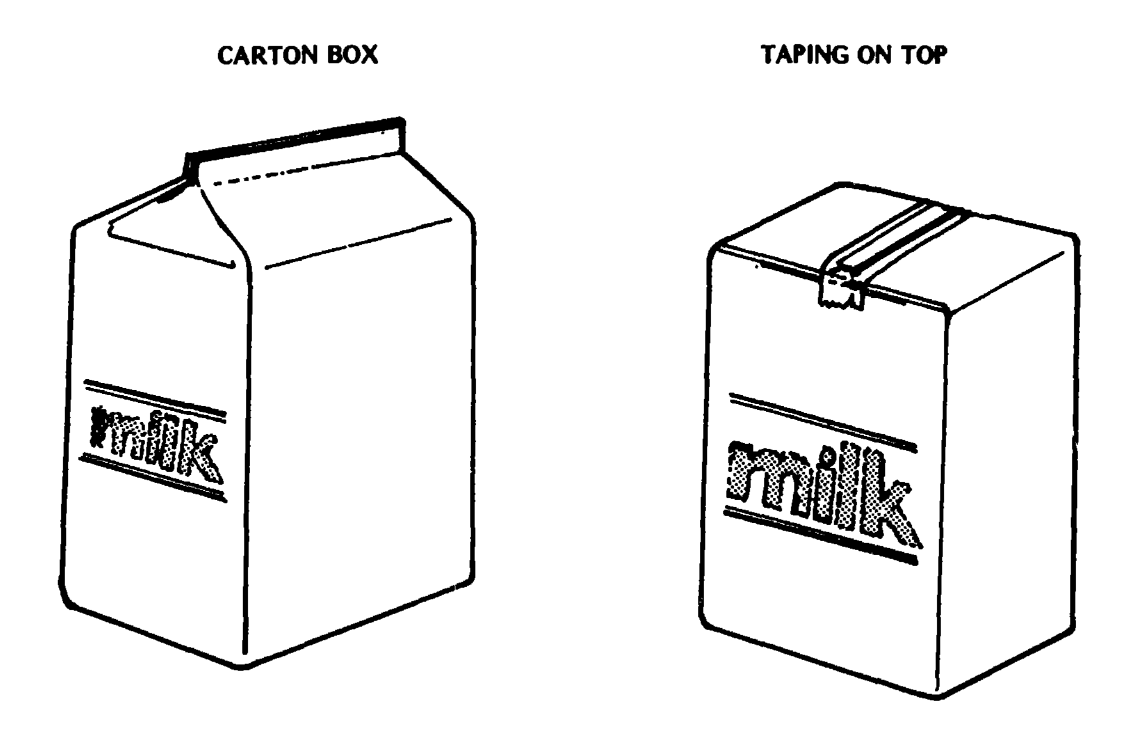
3. MATERIALS USED

Used milk/fruit juice carton or cardboard box, cardboard, adhesive tape, coloured paper and cutting tools.

4. HOW TO MAKE

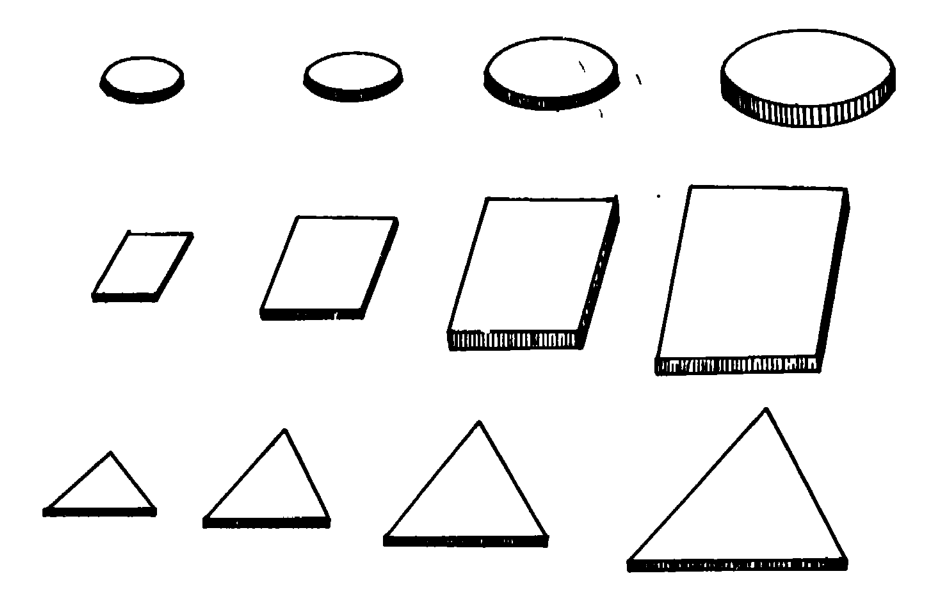
1. The carton box is prepared as shown in the figure below:

CARTON BOX — TAPING ON TOP

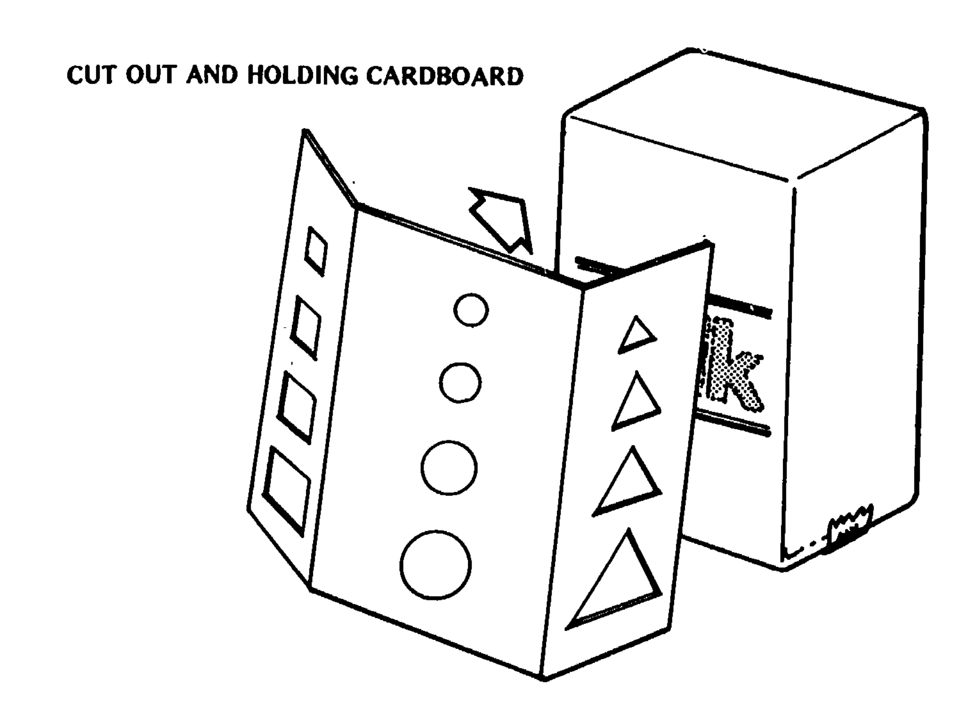


2. Different sizes and shapes of blocks to be cut out from the cardboard.

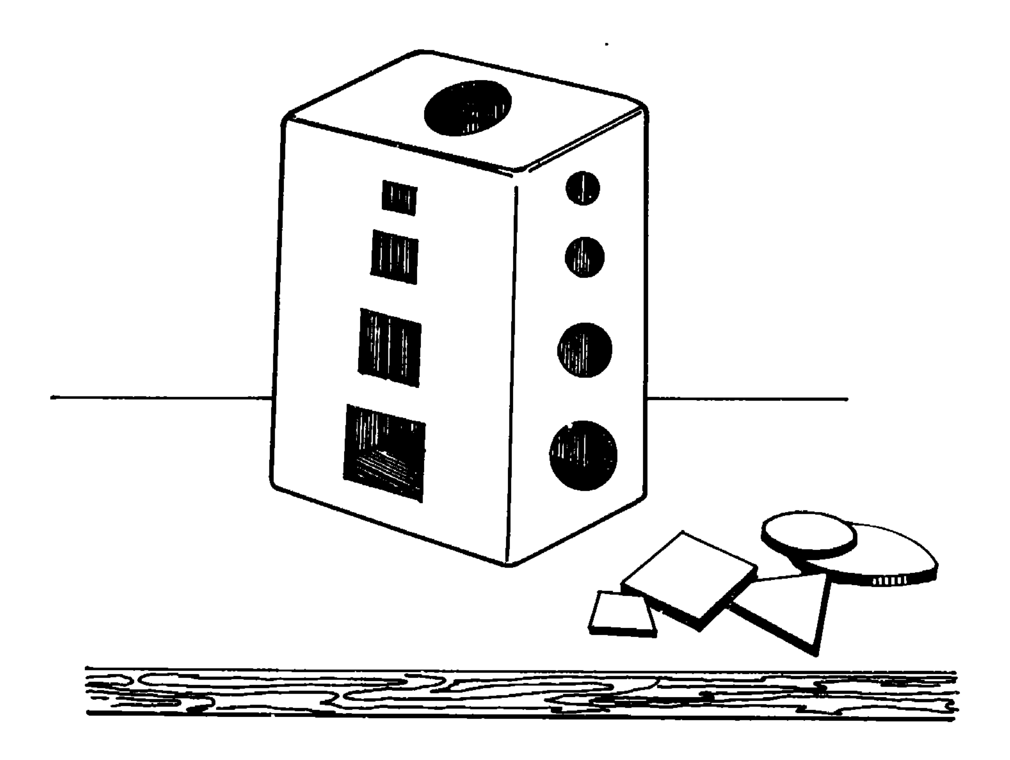
FOUR PIECES OF EACH (COLOURED RED, WHITE, GREEN AND BLUE)



3. Different sizes and shapes of blocks are cut on the cardboard and this cardboard is mounted round the carton box.



4. The top hold is made in such a way that it is large enough such that if something is placed on top, it will fall down into the box.



5. HOW TO USE

By placing particular colour blocks in their proper places we can ask the children what colour they are. We can also ask the children to pick up a particular colour block and place it in the proper place of the box. Thus they will try to find the block of the particular colour and particular size. In this way, they can get the concept of colour and size. By placing stones or small pieces of other materials from at least 3 ft. above the box, they can also get the concept of numbers and sizes.

Source: *"An Instruction Sheet" developed by the participants of the Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kuala Lumpur, 5-15 December, 1977.*

SHEET 8

WORD MATCHING BOX

1. BRIEF DESCRIPTION

This teaching device is a box with two windows in which words in English and (Nepali) could be matched. The words are written on long strips of paper and wound around rounded sticks. When the sticks are rotated, the words appear on the windows.

2. OBJECTIVES

1. To match words in English with words in (Nepali) with the same meaning.
2. To help children learn some common expressions in English and their equivalent in (Nepali).

3. MATERIALS NEEDED

Cardboard box, pins or thumb-tacks, four rounded sticks, tape and crayons.

4. HOW TO MAKE

1. Cut two windows on the box and also two holes at the end of the box. See Figure 1.
2. Write down common words/expressions in English on a long strip of paper. Write their equivalent meaning in (Nepali) on another strip.
3. Wind the strips around the rounded sticks and fix them inside the box in such a manner that when rotated from the outside, words/expressions appear at the windows. See Figures 2 and 3.
4. Rotate the sticks to match two words/expressions together.

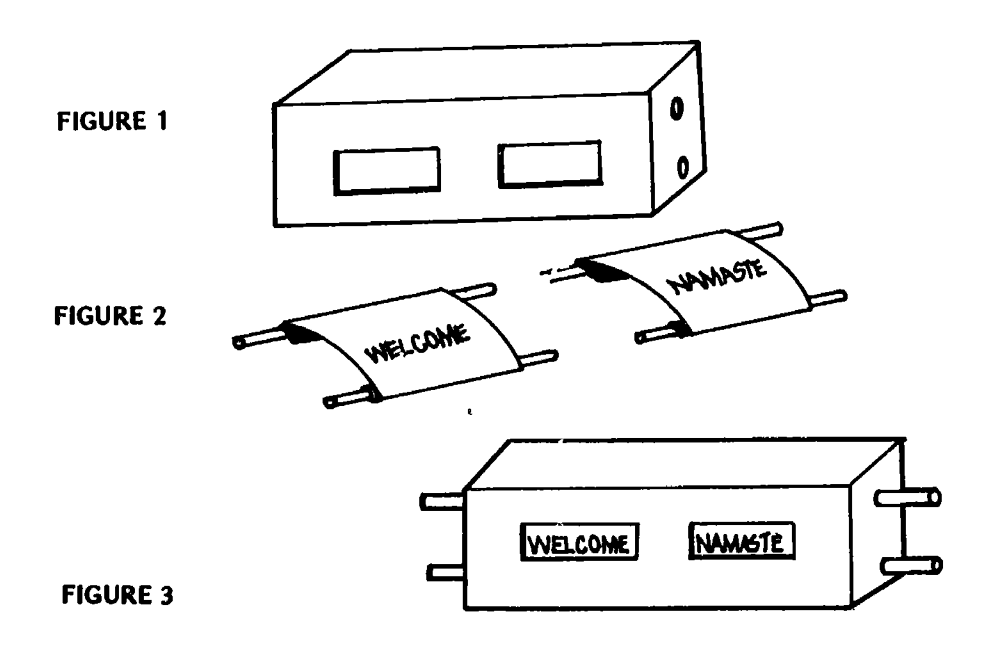


FIGURE 1

FIGURE 2

FIGURE 3

5. MODIFICATION

1. This device can be adapted in any subject area.
2. Words and pictures may be matched together instead of words alone.

Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 9

FUN WITH MAPS

1. BRIEF DESCRIPTION

Maps can be fun with children when they are initiated into map reading and study them very informally. Coloured maps from airline or shipping companies will provide rich learning experiences if the children are permitted to cut them out for puzzles and games or trace the maps for other learning purposes.

2. OBJECTIVES

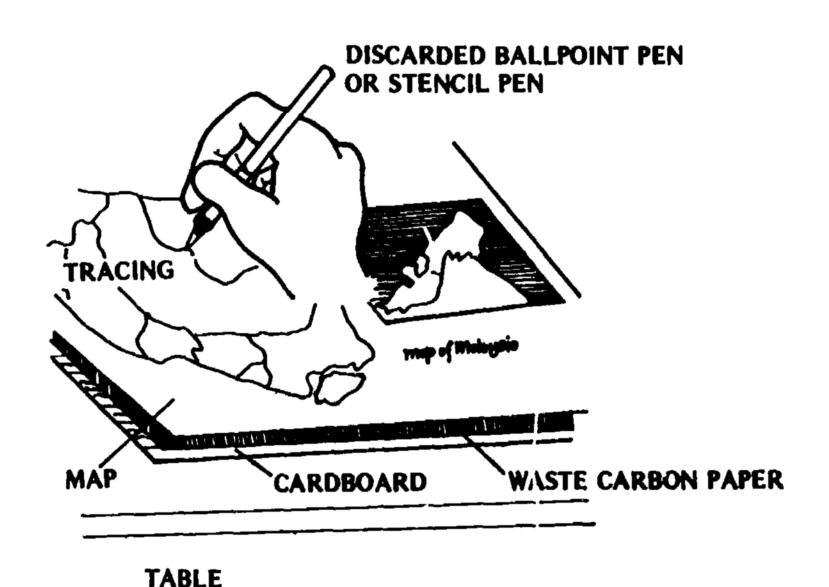
1. To assist children in recognizing and appreciating shapes of different countries such as the children's own country, the region and the world.
2. To take children on an imaginary tour to different countries.
3. To make inexpensive maps from fun materials.

3. MATERIALS USED

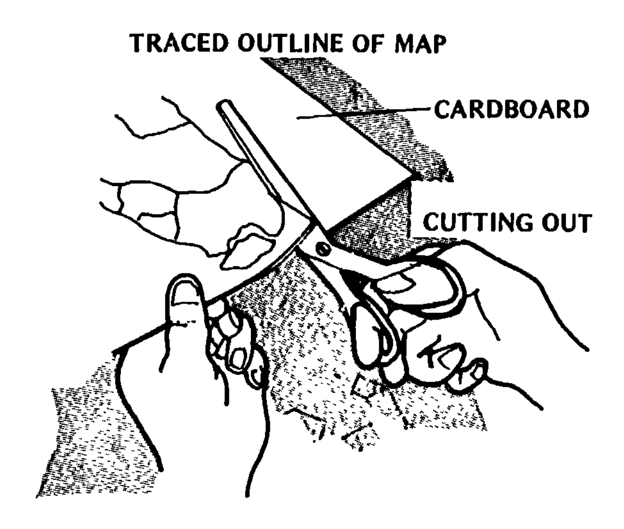
Two maps (e.g. Malaysia); these may be obtained free of charge from travel agencies, oil companies, high commissions, government departments, etc., stencil pen, scissors, glue, masking tape, cellophane tape, paper clips, knife and thumbtacks.

4. HOW TO MAKE

1. Place a cardboard on the table.
2. Place a waste carbon paper on the cardboard.
3. Place a map on the carbon paper.
4. Use discarded ball-point pen or stencil pen to trace the outline of the map and the boundary lines of each state. Label names of the states accordingly. (Now you have a traced outline map).



5. Cut out the traced outline map.

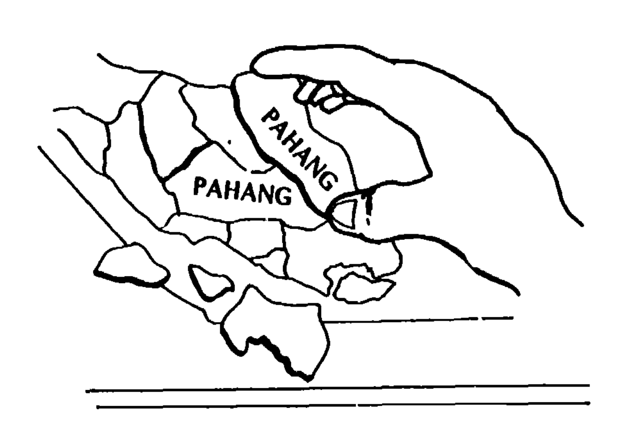


6. Cut out each state from this map by following the boundary lines. (You have a cut-out of the states). Keep these cut-outs in a used paper bag or plastic bag.
7. For making an outline map, use an original map (of Malaysia) and ask pupils to cut out the map (of Malaysia) along the boundaries. Paste the remainder of the original map on the cardboard. Now you have a blank map (of Malaysia).

5. HOW TO USE

[Suggested games]

1. Pupils can have varied matching games by placing each cut-out state on the traced outline map or the blank map.
2. Teacher tells pupils to draw a map (of Malaysia) without looking at an original map. Label each state on this map and use cut-out of the states for matching and correction purposes.



Source: *"An Instruction Sheet" developed by the participants of the Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kuala Lumpur, 5-15 December, 1977.*

SHEET 10

TANGRAM

1. BRIEF DESCRIPTION

This is a versatile instructional material which is suitable for all levels within the school system for the development of manipulative skills and observation and recognition of shapes and sizes.

2. OBJECTIVES

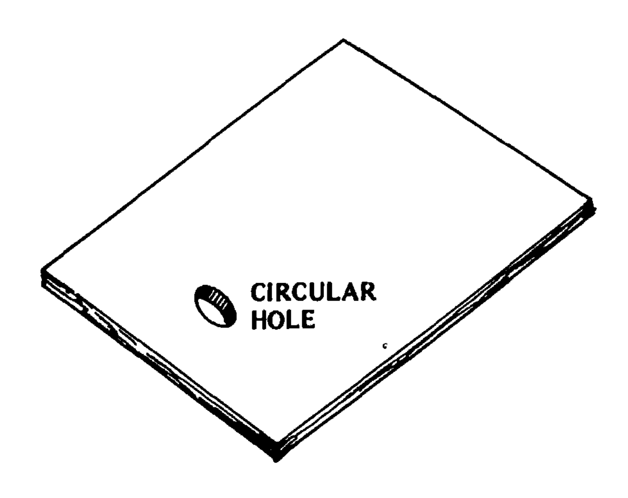
1. To develop concepts relating to shapes, sizes and conservation of area.
2. To develop manipulative skills.
3. To develop constructive and imaginative ability.
4. To develop a child's awareness of the shape of things in his/her environment.

3. MATERIALS USED

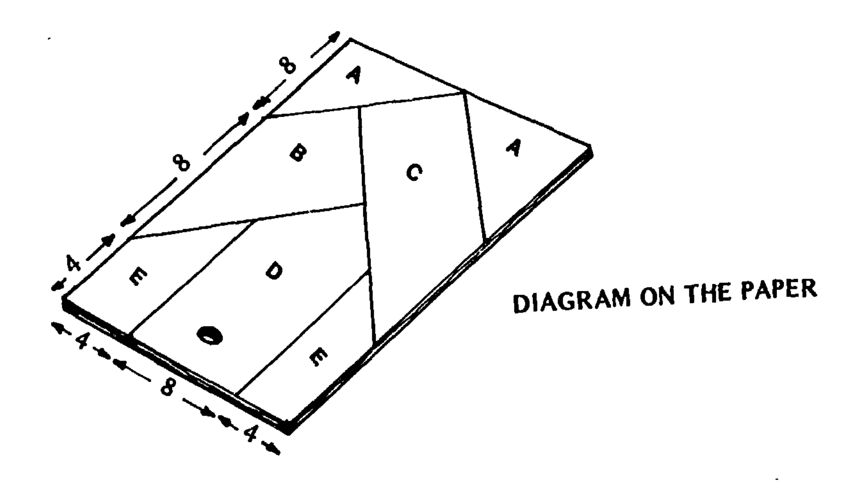
- A rectangular board as base (approximately 18cm x 22 cm) of plywood or other materials such as hardboard, softboard, thick cardboard, scrap wood, plastics, metalsheet, etc.,
- Frame for the sides to hold the tangram (similar materials as the board).
- Tangram material – styrofoam, plasticfoam, rubberfoam, rubber sheets, thick cardboard, softboard, paper-mache, plywood, etc. (material should preferably be easily shaped or cut, and light and durable).
- Hammer, nails, hacksaw, penknife, glue.

4. HOW TO MAKE

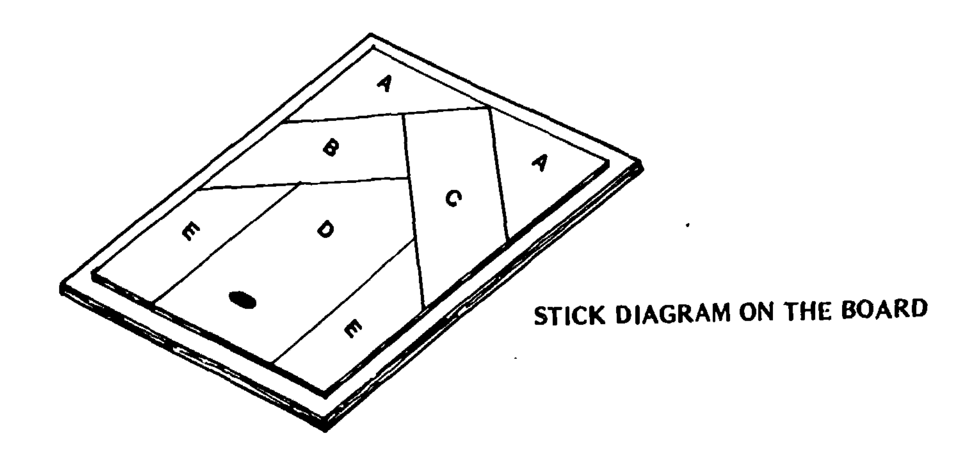
1. Prepare a rectangular board (18 cm x 22 cm) using materials suggested above.
2. Cut a small circular hole in the lower half of the board as illustrated, to facilitate removal of the pieces of the tangram from the board.



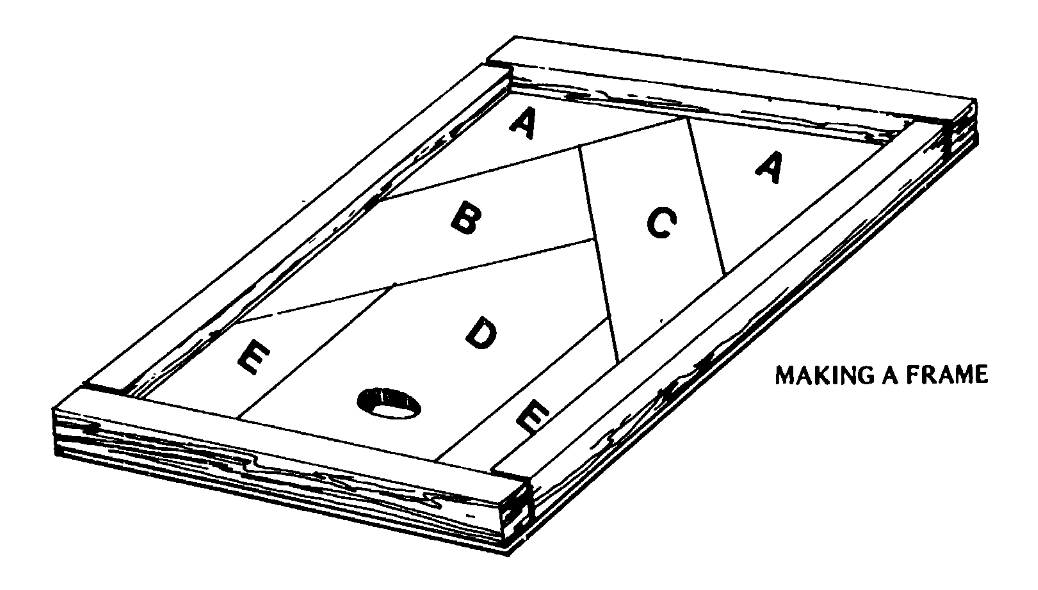
3. Draw a diagram on a piece of paper as shown below.



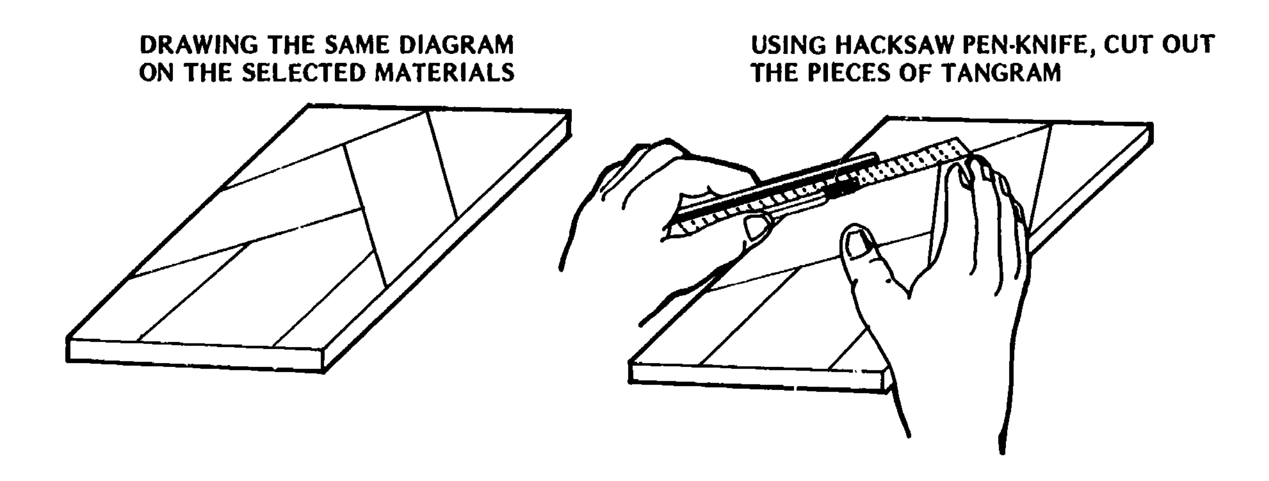
4. Stick the diagram on the board.



5. Make a frame using either nails or glue with strips of materials similar to that of the board.



6. Cut a rectangular piece identical in area to the inside of the board. (Use one of the selected materials for the tangram.)



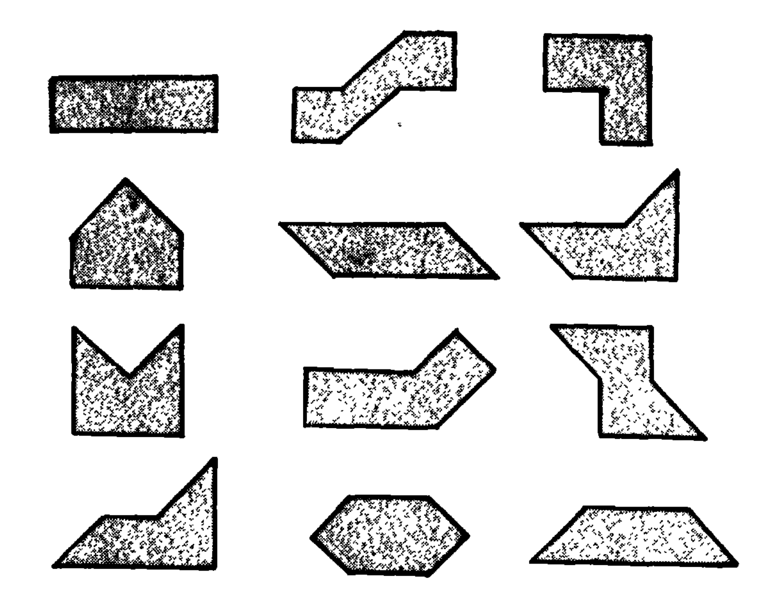
5. HOW TO USE

This can be used for developing:

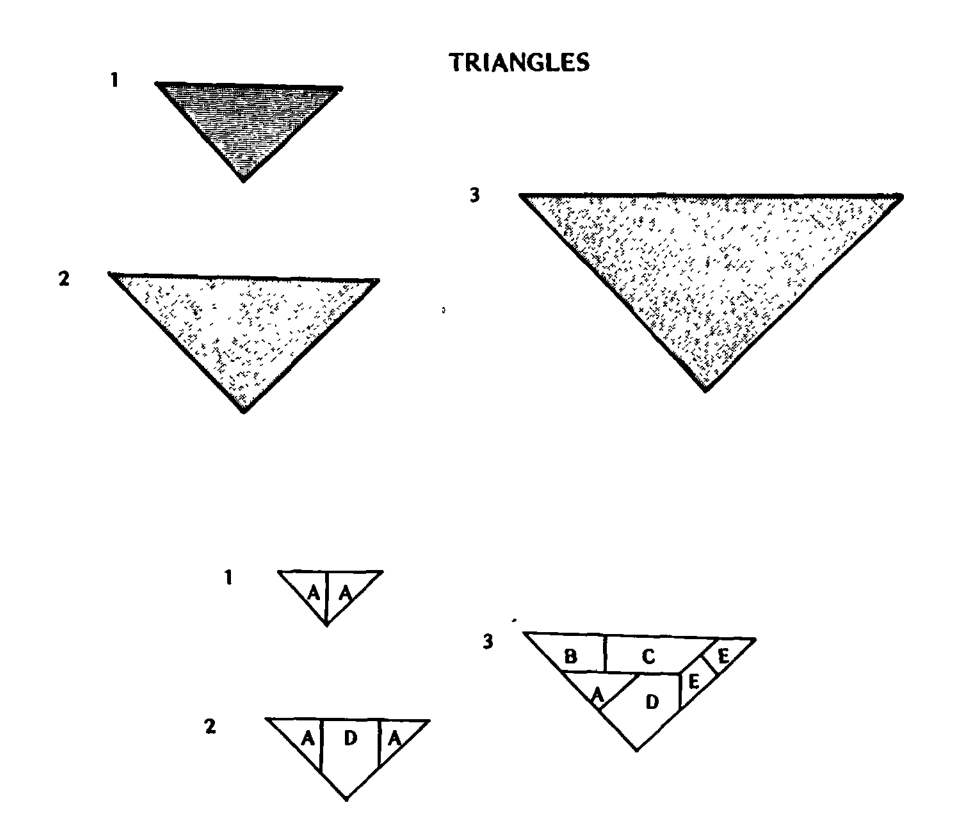
1. manipulative (psycho-motor) skills,
2. recognition and matching of shapes,
3. constructive and imaginative ability,
4. concept of shapes, sizes, area and angles.

Examples of the formulation of different shapes are given below:

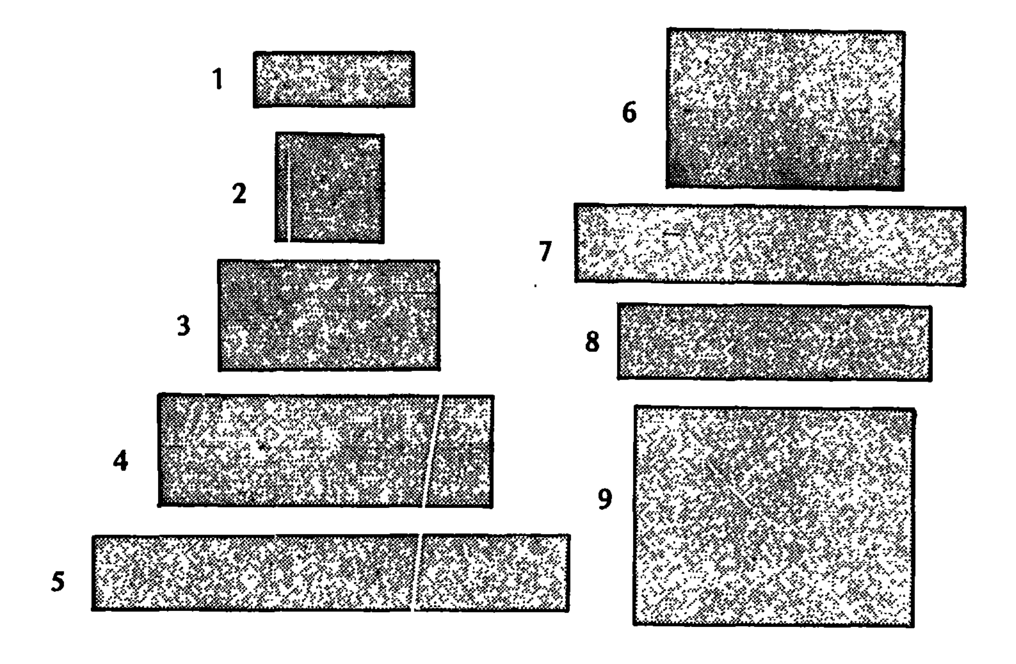
VARIETY OF SHAPES WITH TWO OF "E"S

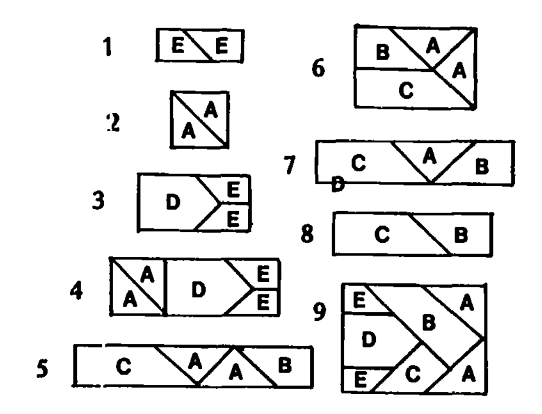


TRIANGLES

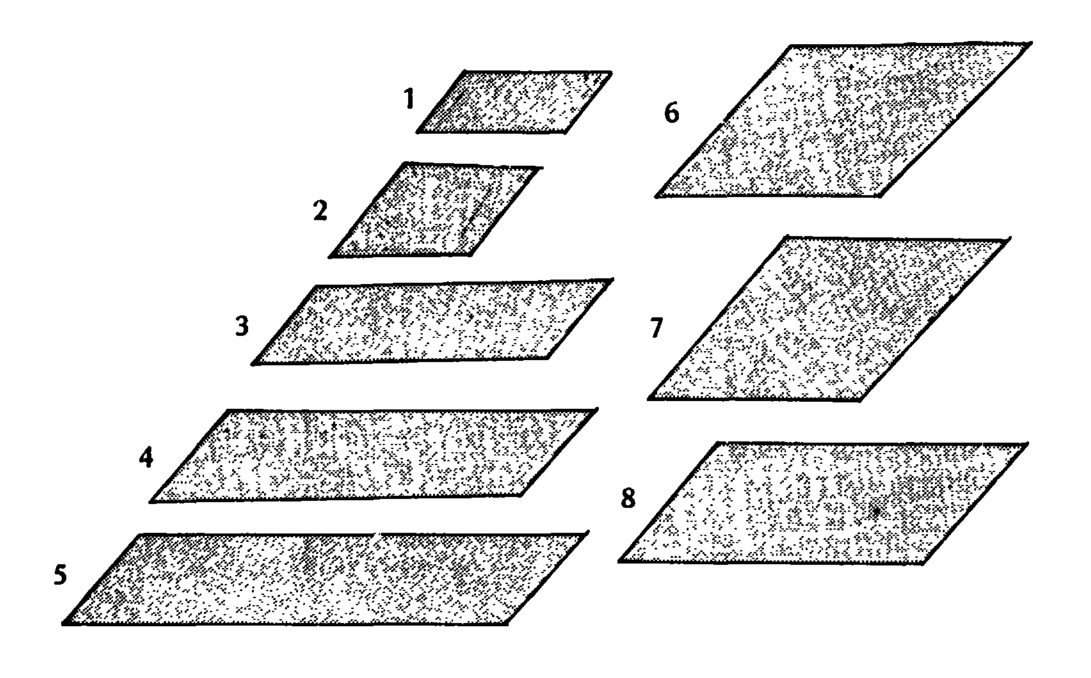


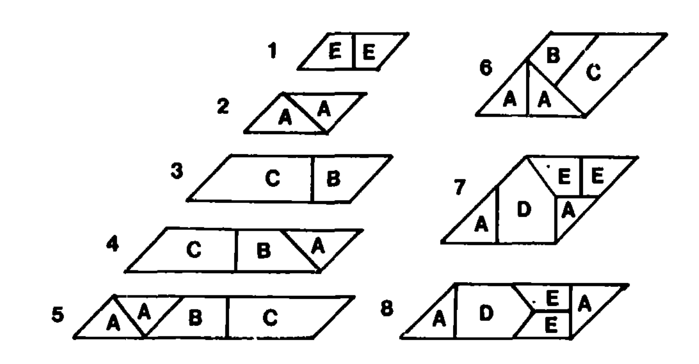
RECTANGLES


1
2
3
4
5
6
7
8
9

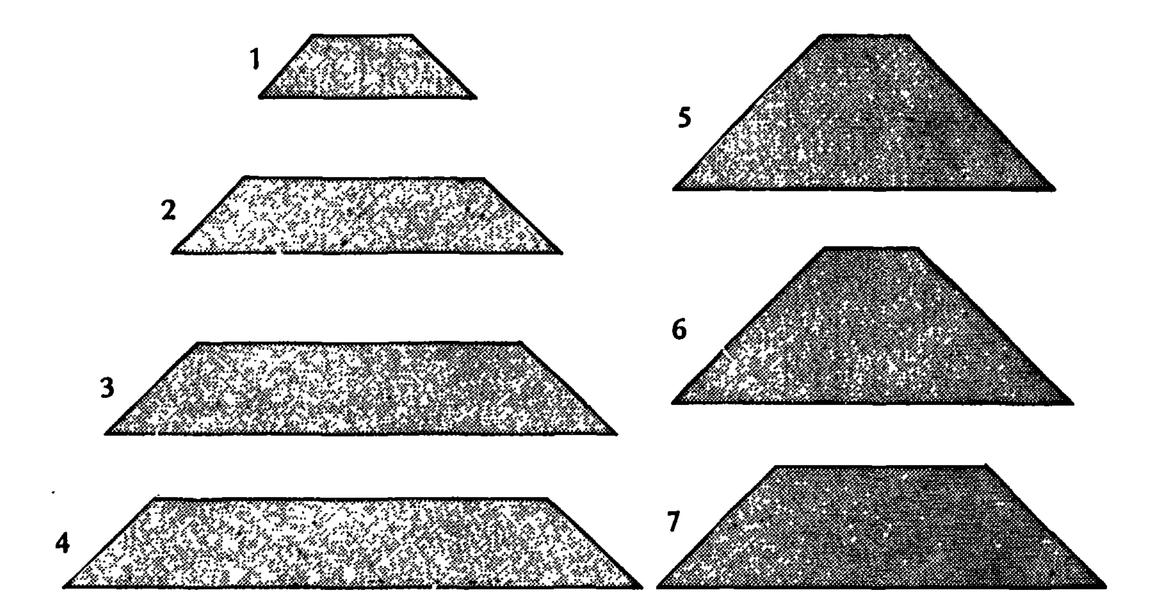

1 E E
2 A A
3 D E E
4 A A D E E
5 C A A B
6 B A A C
7 C A B D
8 C B
9 E A B D E C A

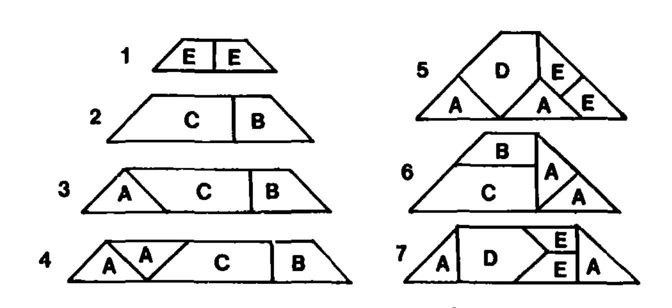
PARALLELOGRAMS



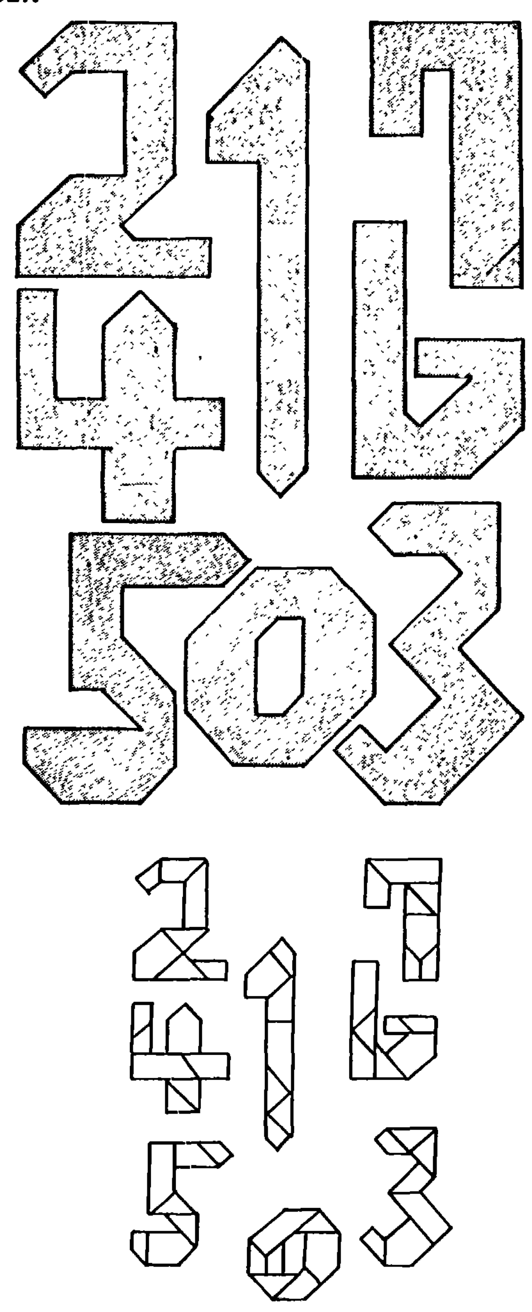


TRAPEZOIDS

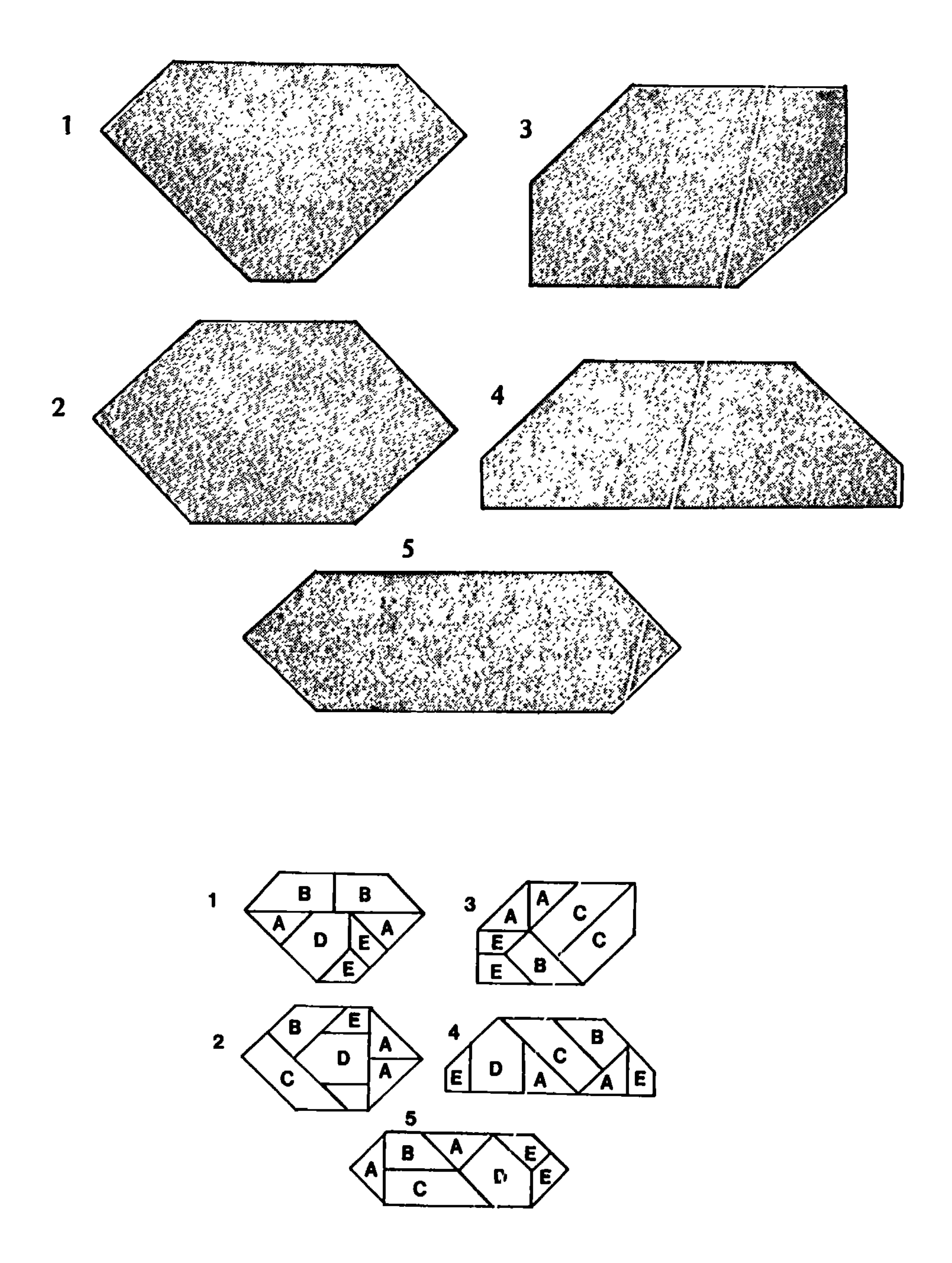




ARITHMETIC NUMBER



HEXAGONS



Source: *"An Instruction Sheet" developed by the participants of the Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kuala Lumpur, 5-15 December, 1977.*

SHEET 11

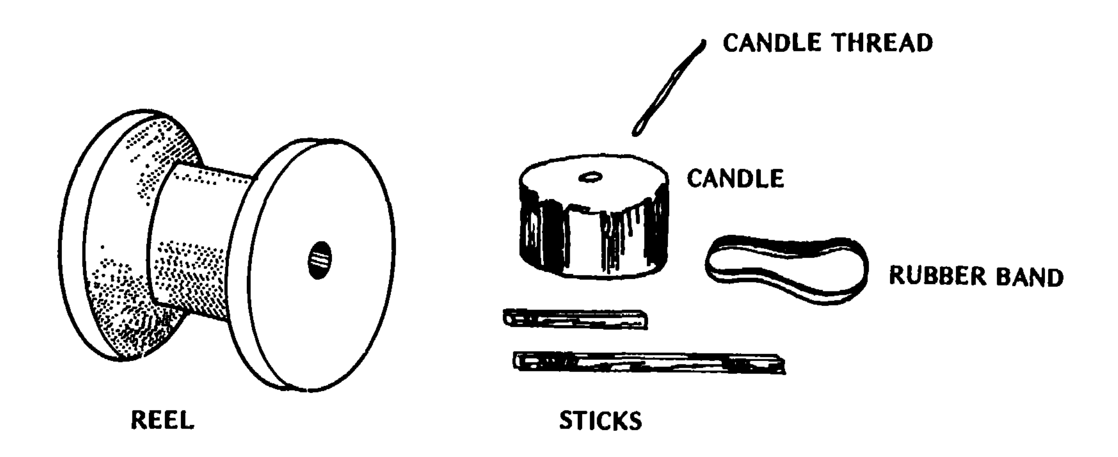
ROLLER (CAR)

1. BRIEF DESCRIPTION

An interesting toy-roller is made from an empty thread-reel with the help of some equally simple materials. The simple formula of making a self-moving roller is to attach two sticks (one longer than the other) in the hole of the reel held by a rubber band. When the rubber band is given several twists, because of its tendency to unwind itself, it forces the candle-piece attached to the hole to roll the reel for some distance.

2. MATERIALS USED

A thread reel (wooden), a strong rubber band, a candle-piece of 1 – 1½ cm in length (centre thread pulled out), two sticks – one, 2 cm long and the other 5 – 7 cm in length.

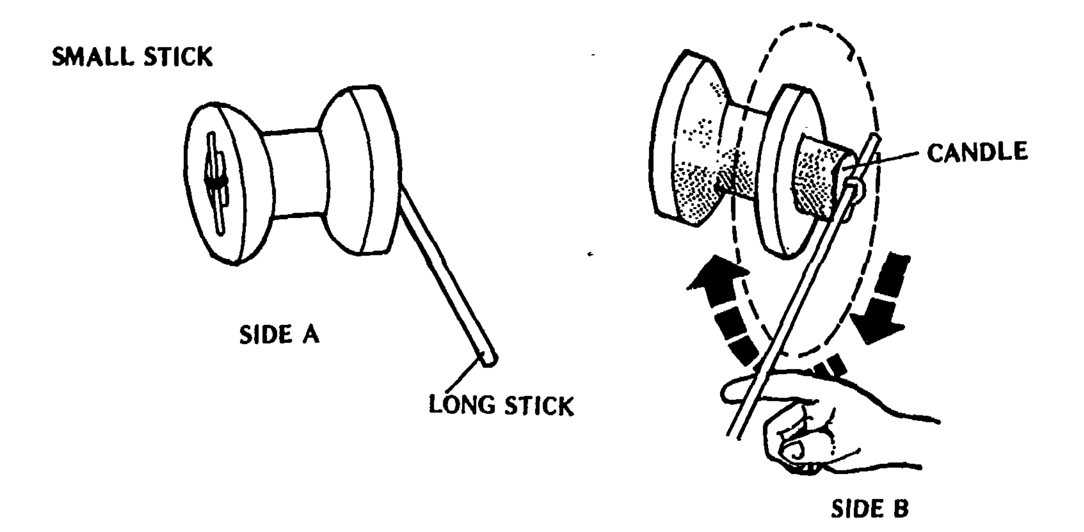


3. OBJECTIVES

1. To generate concept of creativity.
2. To introduce concept of motion (in relation to force).
3. To utilize simple waste materials in creative exercises.

4. HOW TO MAKE

1. Insert rubber-band through the hole of the reel.
2. Hook one end of the rubber-band into the hole of reel with the smaller stick. The other end of the rubber-band (from the other side) is first passed through the (thread-line empty) candle-piece (of a larger diametre than the reel hole) and the end hooked to the long stick, then released.



5. **HOW TO USE**

Move the long stick in a clockwise direction three or four rounds or more if necessary. Use the fore-finger (as shown in the figure) to give a tight twist to the rubber inside. Then place the reel on the ground. The long stick would slowly come down to rest on the ground. The reel, then, would begin to move slowly forward up to a certain distance (till the rubber-band is fully untwisted).

To make the motion of the toy more interesting, a thin plank-like material (may be made of paper, tin, etc.) is placed (slightly raised – but sloped to the ground) in front of the reel. The roller would continue to travel inspite of the sloped-height.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys" prepared by Mr. M. Chitrakar, Janak Educational Material Centre, Nepal.*

SHEET 12

CHILD'S MOTOR CAR

1. OBJECTIVE

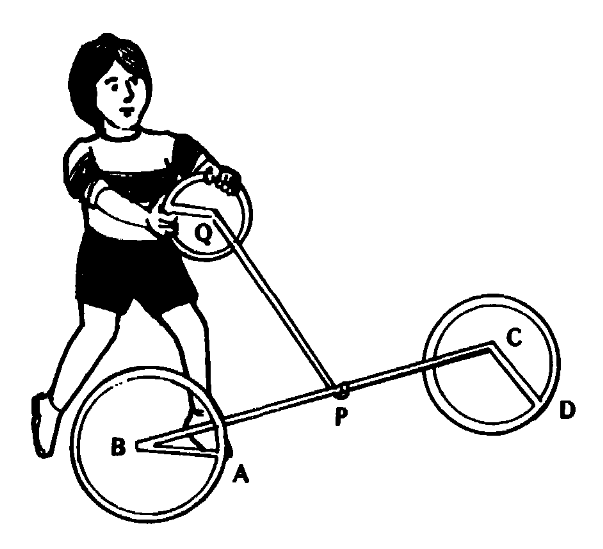
To enable a child prepare his own motor car.

2. MATERIALS USED

Thick wire and hammer.

3. HOW TO MAKE

1. Take about 100 cm of steel wire which can be hammered into shape.
2. Starting with end A, a circle (wheel) of wire is made and then bent to its centre B.
3. From there it is straightened to point C and then rotated to make a similar wire circle (wheel) ending the wire length at D.
4. Another wire of similar length is taken. One end of it is looped at the central point P between the wheels AB and CD. From P, it is similarly taken straight to Q and then made into another wheel (the steering wheel).



4. HOW TO USE

1. The child walks with the steering wheel in his hand, twisting it whenever he wishes to turn his vehicle.
2. The child can also make a four-wheeler cart similarly, on which he can place a tin can to carry his books, play material etc.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in India" prepared by Dr. M.M. Chaudhri, Head, Department of Teaching Aids, National Council of Educational Research and Training, India.*

SHEET 13

ALPHABET/NUMBER CARDS

1. BRIEF DESCRIPTION

The set of coloured cards or heavy paper are at least 12 cm x 20 cm in size. The letters of the alphabet or numbers one to ten are written on each piece with the corresponding visual or illustration. The identification of each card is indicated on the reverse side of the card.

2. OBJECTIVES

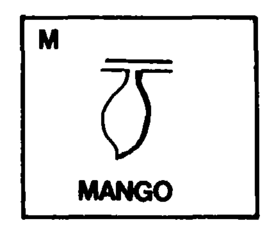
1. To develop the concepts of the alphabet and numbers
2. To be able to identify letters of the alphabet and numbers and
3. To be able to identify objects related to the letter or the number.

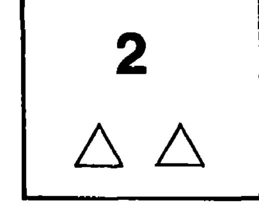
3. MATERIALS USED

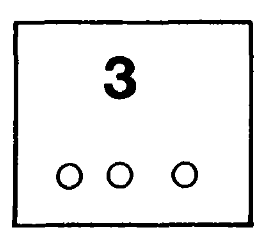
Hard paper or cardboard, preferably coloured ones, writing or drawing instruments, scissors and rulers.

4. HOW TO MAKE

The drawing sheets or cardboards of different colors are cut into small pieces as shown below. In each card, the letter and corresponding name of any item is written with the picture of that item drawn on the card. In the case of numbers, the number together with the drawing of the corresponding number of things are written on the card.







5. HOW TO USE

The teacher may ask the pupils by showing the different cards, about the numbers and letters which are written on the cards. This will give the pupils the opportunity to express their ideas about letters and numbers.

Source: *"An Instruction Sheet" developed by the participants of the Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kuala Lumpur, 5-15 December, 1977.*

SHEET 14

INSTRUCTIONAL TUBE

1. BRIEF DESCRIPTION

This instructional tube is conceived for individual use by pupils and, being in the form of a mobile instrument which they can manipulate, is intended to stimulate interest and self-activity. Pupils working individually will learn to solve simple mathematical problems (addition/subtraction/multiplication/division). Immediate feedback is given to the pupil (right/wrong answer) by the color code in the windows at the back of the tube. This instructional tube is applicable to other curricula (language teaching, geography, etc.) by simply making new inner tubes with other programmes.

2. OBJECTIVES:

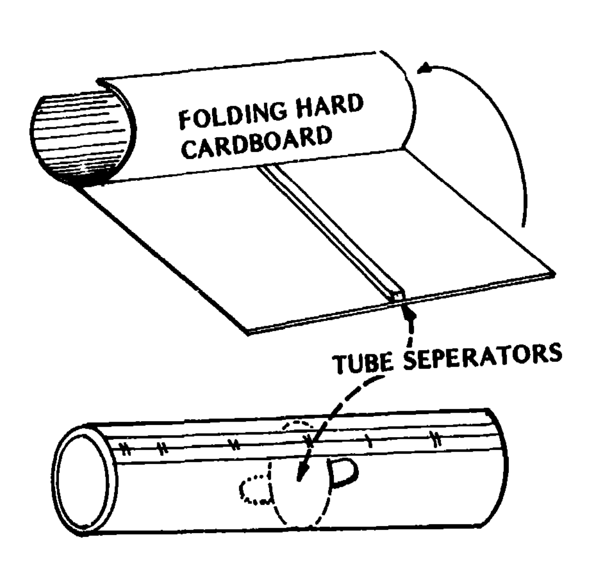
1. To develop independent performance with considerable speed among children, in the solution of simple mathematical problem
2. To train the children to check their own work and correct wrong responses immediately and
3. To find other possible uses for the instructional tube.

3. MATERIALS USED

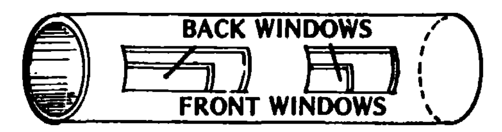
Two cardboard tubes which will fit into each other – the inner tube must be of thinner materials than the outer one, glue, coloured pencils or pens, coloured paper, a word base and cutting tools.

4. HOW TO MAKE

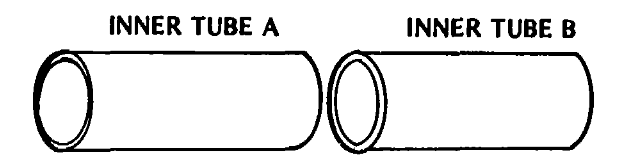
1. To make the outer tube, use the hard cardboard and fold it into a tube and tape it with masking tape.
2. Separate the tube into two parts by either pasting a thick strip of cardboard across the inside of the folded tube or by making a round piece of cardboard with opposite straps to insert through the holes on the surface of the tube.



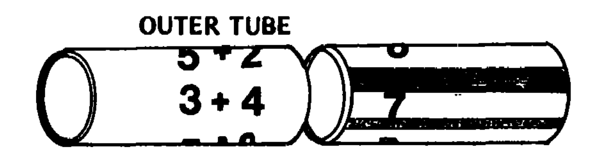
3. Cut two windows on tube one on the right, the other on the left with two other corresponding windows on the back side of the tube.

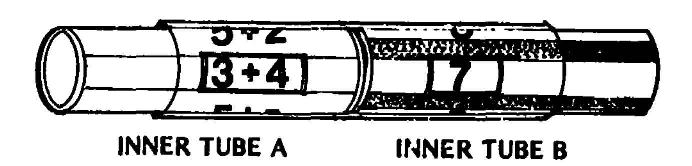


4. To make the inner tubes, use the thinner pieces of cardboard and fold them into two tubes to be inserted into the outer tubes, one on the right and the other on the left.

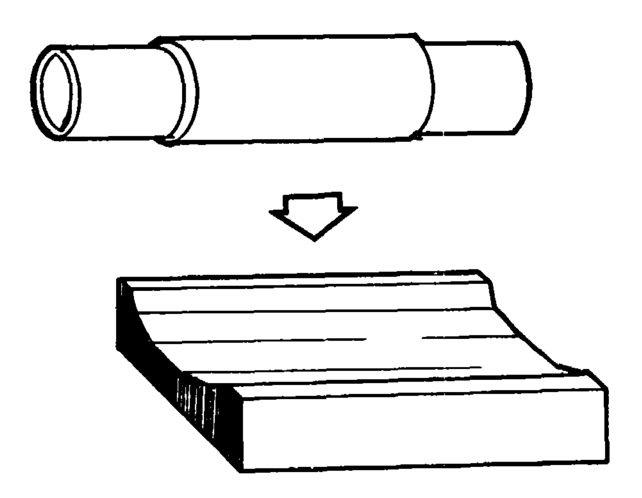


5. Write the problem through the left window, the answer on the right window and apply the identical colour on the two back windows. Turn the inner tube more and repeat the process.





6. Mount the instructional tube onto the piece of wood for stability and ease in manipulation.



5. HOW TO USE

1. Insert the inner tube A in the left hand side of the outer tube with a problem to be solved showing through the window.
2. Insert the inner tube B in the right hand side of the outer tube and turn until correct answer appears.
3. The answer can be checked at back windows: two similar colors indicate correct answer.
4. Turn left hand tube for new problem and repeat process.

Source: *"An Instruction Sheet" developed by the participants of the Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kuala Lumpur, 5-15 December, 1977.*

SHEET 15

STICK/STRING PUPPETS

1. BRIEF DESCRIPTION

These are puppets representing the main characters in "My English Book I" which is used in Nepal. They are Ram, Sita, Hari, Rita and Mr. Singh. The puppets are made of cardboard. When the string is pulled, the limbs move up and down.

2. OBJECTIVES

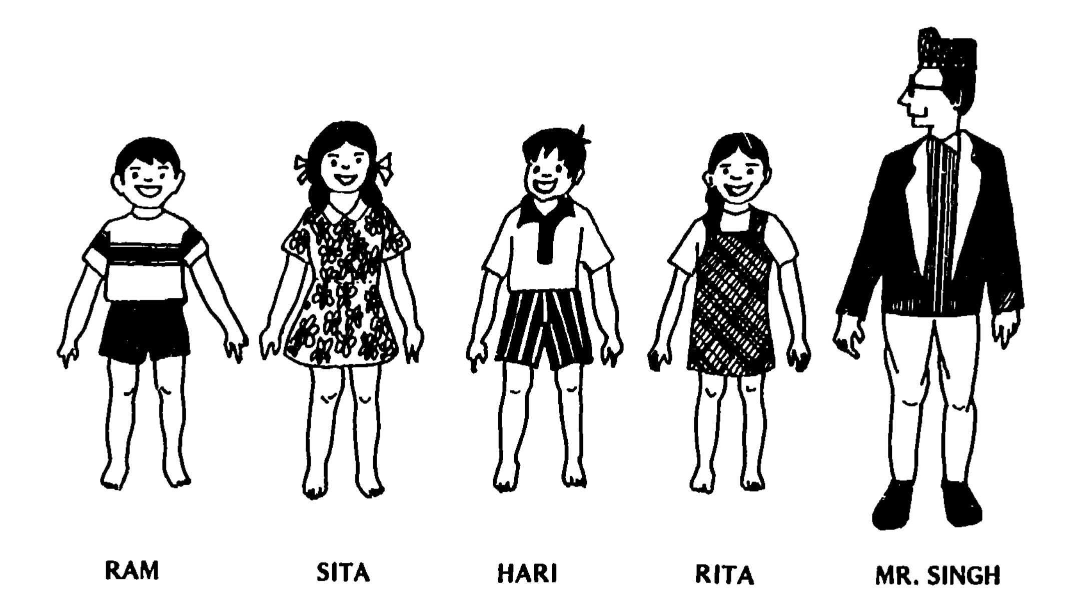
1. To identify the main characters in the book, "My English Book I", pages 11 and 12.
2. To identify the different parts of the body, "My English Book I", page 52.
3. To dramatize a story using the puppets as the main characters, "My English Book I", page 47.
4. To develop a speaking vocabulary by telling a sentence or two about the puppets, "My English Book I", page 42.

3. MATERIALS NEEDED

Cardboard, colour, scissors, needle, string, stick, empty soft drink bottles and paste.

4. HOW TO MAKE

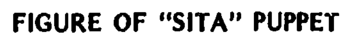
1. Draw on paper the main characters in the story. Draw them according to the desired sizes.



RAM SITA HARI RITA MR. SINGH

2. Cut and trace the trunk, arms and legs on a piece of cardboard. Allow an inch space at the top of the arms and legs and round off the edges. (See figure on page 36). Colour the clothes and body parts.

FIGURE OF "SITA" PUPPET



3. **Arms.** Thread needle with string and make an end knot. Pull needle through holes No. 1 and No. 2. Secure the two parts tightly together and knot. Without cutting the string, pull it through hole No. 3 then across to No. 4. Place the arms straight downward and in this position, knot string at No. 4 and cut.

   Follow the same procedure in attaching the other arm.

4. **Legs.** Make a knot at the end of the string. Pull needle through hole No. 5 and No. 6. Secure the two parts tightly together and knot. Without cutting it, pull the same string through No. 7, then across to No. 8. Place the legs straight downward and in this position, knot string at No. 8 and cut.

   Follow the same procedure in attaching the other leg.

5. To make the limbs move, tie a piece of string to hole No. 9, then down to No. 10. Allow the end portion (about three inches or 8 cm) to hang loose, then cut. Paste the name of the doll and the words "Make me dance!" at end of string.

5. HOW TO USE

1. Use the puppets in introducing the main characters in the English textbook "My English Book I", pages 11 and 12. Allow children to manipulate the puppets to make the lesson more interesting.
2. Use the puppets in identifying the different parts of the body, "My English Book I", page 52.
3. Use the puppets to dramatize a stroy in the textbook "My English Book I", page 47. Children may hide behind a table or chair or curtain with only the stick puppets showing. Shy children are encouraged to participate in this manner.
4. Practise speaking English by telling a few sentences about each puppet.

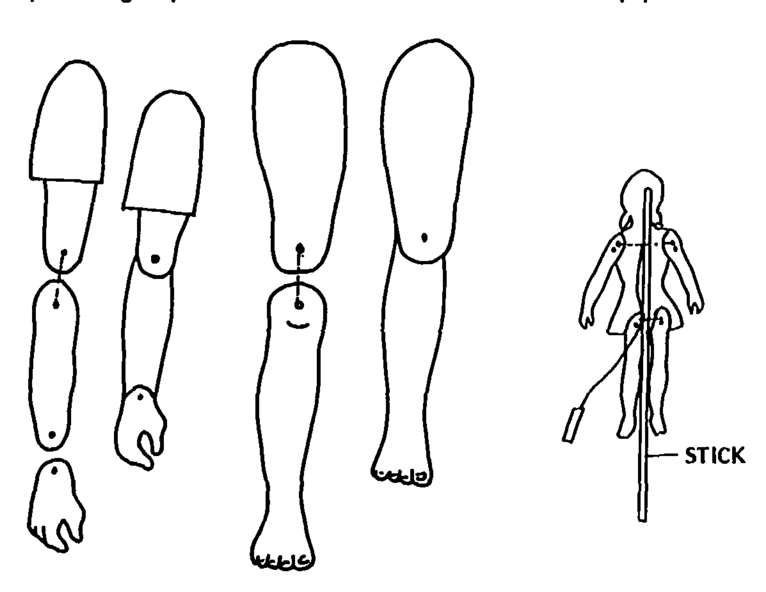
   Example:

   My name is Mr. Singh.
   I am a teacher.
   Ram and Sita are my pupils.
   Hari and Rita are my pupils too.

   My name is Ram.
   Sita is my sister.
   I go to school.
   Mr. Singh is my teacher.
   Hari and Rita are my friends.

6. MODIFICATION

The limbs can be further divided into joints so that when pulled, they will have a variety of movements, as shown below. The characters may be hung or placed on a stick and made to stand in empty soft drink bottles.



Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 16

A OR AN BINGO

1. BRIEF DESCRIPTION

This game is a drill in strengthening concepts in the use of a and an. It follows the principles of bingo. Two teams take turns answering questions found inside the boxes which are arranged in rows of four.

2. OBJECTIVES

1. To develop mastery in the use of A and An.
2. To develop the habit of following rules and instructions.
3. To show the importance of co-operation in team work.

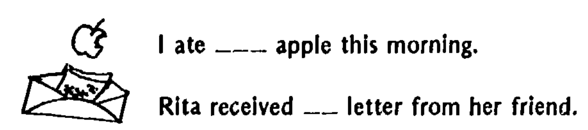
3. MATERIALS NEEDED

Wide piece of cardboard or board, sixteen empty cigarette boxes or other similar boxes and cut-out drawings of boys and girls.

4. HOW TO MAKE

1. Gather or make 16 empty boxes and paste them on the cardboard in rows of four.
2. Write 16 sentences which require either A or An.

   Examples:



I ate ___ apple this morning.

Rita received __ letter from her friend.

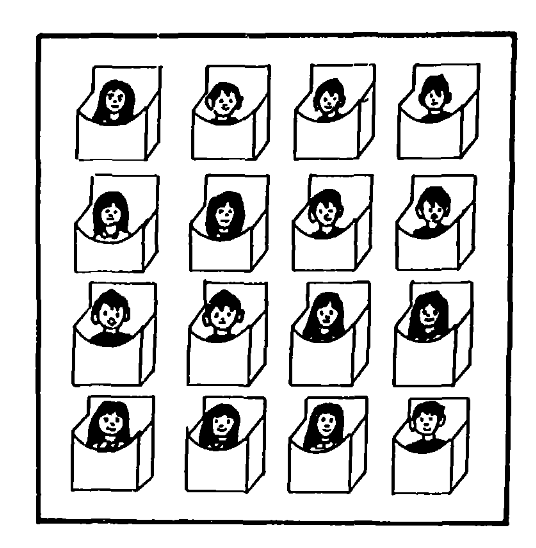
3. Place a question inside each box.
4. Cut out drawings of eight boys and eight girls.

5. HOW TO USE

1. Divided the class into two teams – boys and girls.
2. Explain to them the rules of the game:
   a) The teams take turn answering questions.
   b) Each team should complete sentences in boxes attempting to complete a row either arranged vertically, horizontally, or diagonally.
3. Once the sentence is completed correctly, a picture of a boy (or girl as the case may be) is placed inside the box to mark it.
4. The first team to complete correctly the sentences in the boxes in a row wins the game. (Use X and O for boys' or girls' classes)

6. MODIFICATIONS

1. Sentences or questions related to other subject areas such as reading, social studies, science and health and far more complex – may replace the A and An sentences.
2. The number of boxes may be changed to nine (rows of three) or 25 (rows of five). As smoking is dangerous and bad for the health, the teacher will be able to work in a lesson in health by stressing that other boxes are to be used.
3. The game may be raised to higher levels according to the complexity of the questions: completion sentences, true or false questions or even eassy questions may be tried.



Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 17

PREPOSITION CLOCK

1. BRIEF DESCRIPTION

This game is intended for use in lower primary schools, to help in developing and strengthening concepts of **In, On, Over, Under** and **Above**. It may be used as a drill or review for a specific lesson in an English book. It consists of a big circle resembling the face of a clock. Pictures demonstrating the concepts of **In, On, Over, Above** and **Under** are pasted along with the numbers 1 to 12. A small revolving circle with a long hand is tucked in the middle of the clock.

2. OBJECTIVE

To help children in the lower grades learn how to use the prepositions **In, On, Over, Under** and **Above** correctly in sentences.

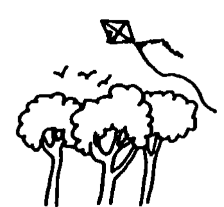
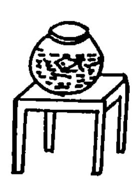
3. MATERIALS NEEDED

Big cardboard clock (16" or 40 cm in diameter), cardboard wheel (6" or 15 cm in diameter), pictures, paste, scissors and nail.

4. HOW TO MAKE

1. Draw a big clock face (16 inches or 40 cm) on a wide piece of cardboard.
2. Cut out 12 pictures showing different concepts of **In, On, Above, Under** and **Over**.

   
   Examples:

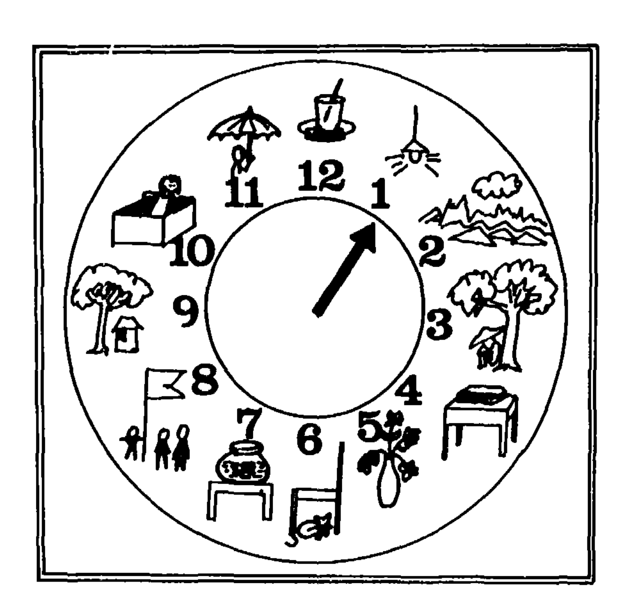
3. Arrange and paste the pictures along with the numbers 1 to 12 around the face of the clock.
4. Paint or paste a long hand on a smaller circle or wheel (6" in diameter).
5. Attach the smaller circle or wheel in the middle of the big clock. Ensure that it can be rotated clockwise and counter-clockwise.

5. HOW TO USE

1. Vigorously rotate the smaller circle or wheel clockwise.
2. Notice at what time or number it stops. Find the picture that goes with the number.
3. Give a sentence or two about the picture using **In, On, Above, Over** or **Under.**

6. MODIFICATION

1. This game can be used in a similar manner in other subject areas by changing the pictures to suit the purpose.
2. Numbers from 1 to 12 may be painted on empty boxes and pasted around the face of the clock. Pictures or questions may be placed inside the boxes to give an element of surprise.



Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 18

SEQUENTIAL THINKING CARDS

1. BRIEF DESCRIPTION

This game consists of a set of cards of five or more pictures. The pictures depict events in sequence.

2. OBJECTIVES

1. To help develop sequential thinking.
2. To develop the ability to arrange events in a story in a sequential manner.
3. To tell a story orally following sequential events.

3. MATERIALS NEEDED

Cards (2½" x 4" or 7 x 11 cm) and crayons.

4. HOW TO MAKE

Draw pictures showing sequential events on five or more cards.

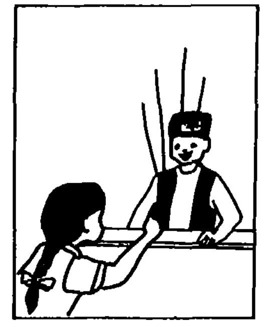
5. HOW TO USE

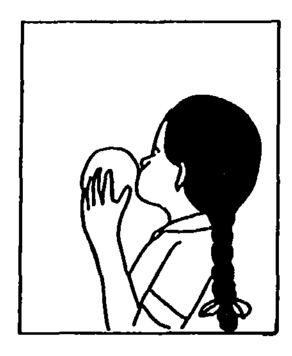
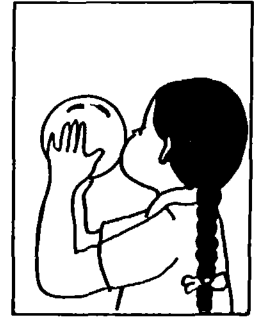
1. Shuffle the cards and give them to a child.
2. Ask him to arrange the set in proper sequence.
3. Ask the child to tell the story in sequence as depicted in the cards.

6. MODIFICATION

Instead of drawing the pictures, cut out magazine or newspaper. pictures that depict a sequence of events and paste them on cards.

SEQUENTIAL THINKING CARDS


Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 19

CLEANLINESS GAME

1. BRIEF DESCRIPTION

This game is composed of a big sheet of drawing paper or a board divided into 50 compartments or rooms. Some of the compartments are illustrated with negative and positive health habits. Four pebbles of different color and an improvised dice accompany the game board.

2. OBJECTIVES

1. To develop number concepts among lower-primary children.
2. To develop the habit of following rules and regulations.
3. To learn how to wait one's turn and play with others harmoniously.
4. To help develop desirable habits of personal hygiene.

3. MATERIALS NEEDED

A big sheet of drawing paper or board, four pebbles of different colours, colours for drawing or painting and a dice made of styrofoam, rubber, bamboo or coconut leaf.

4. HOW TO MAKE

1. Divide the paper or board into 50 compartments or rooms.
2. Number consecutively from 1 to 50.
3. Illustrate compartments or rooms 6, 17, 24 and 28 with positive health habits; and rooms 26, 30, 42 and 44 with negative health habits.
4. Make a dice out of coconut leaf, styrofoam or any material available.
5. Take four small pebbles and paint them in different colors.

5. HOW TO USE

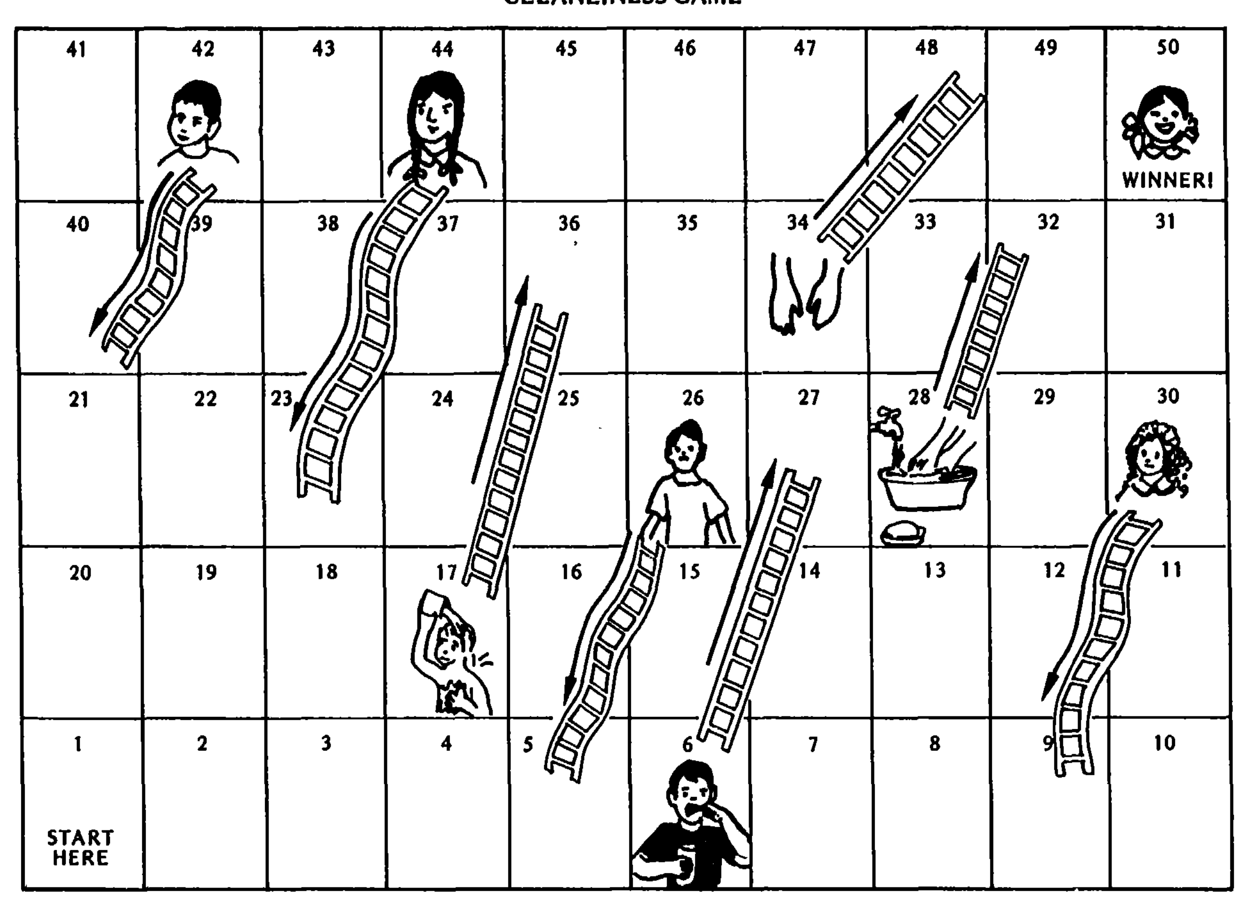
1. Two to four children may play this game. There are four pebbles of different colors.
2. Choose your colour and place it in Room 1. Throw the dice. Move your pebble according to the number that appears on your dice. Each one should wait for his turn. When you come to the picture room, do as follows:

   Room 6 : You brush your teeth daily. Go up.
   Room 17 : You take a bath daily. Go up.
   Room 26 : Your clothes are dirty. Go down.
   Room 28 : You wash your hands properly before eating. Go up.
   Room 30 : Your hair is not combed. Go down and comb it.
   Room 34 : You have clean hands and finger nails. Go up.
   Room 42 : Your eyes and ears are dirty. Go down and clean them.
   Room 44 : You have a running nose. Go down and clean it.
   Room 50 : You are the winner! Congratulations!

6. MODIFICATION

Similar games in other subject areas may be played on the board by changing the illustration to fit the purpose. Examples are a balanced diet game, a road safety game, and so on.

CLEANLINESS GAME



Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 20

CARDBOARD SHAPES

1. BRIEF DESCRIPTION

Cardboard Shapes consists of 48 cut-out pieces of four different shapes (circle, rectangle, square and triangle) in two sizes (big and small).

2. OBJECTIVES

1. To develop visual discrimination in size and form.
2. To develop creativeness in making designs out of various shapes and sizes.

3. MATERIALS NEEDED

An old cardboard and scissors.

4. HOW TO MAKE

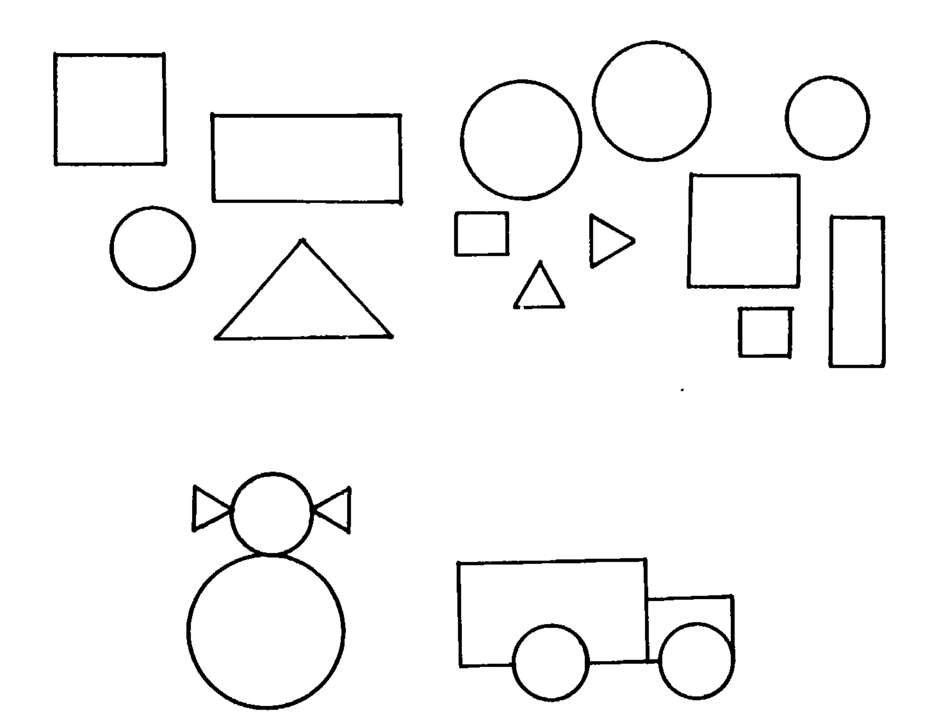
Take a piece of old cardboard. Cut out different shapes – circles, triangles, squares and rectangles in two different sizes, big and small.

5. HOW TO USE

1. First allow the children to handle the materials and to play with them for as long as they like.
2. Ask them to classify the materials according to their shapes.
3. Ask them to classify them into big and small pieces.
4. Encourage them to make designs out of the shapes and sizes.

6. MODIFICATION

Coloured paper or cloth may be pasted on the cardboard shapes to develop colour visual perception in the children.



Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 21

FLYING TUBE

1. BRIEF DESCRIPTION

The flying tube is a very simple toy which can be made from a sheet of paper and a bamboo strip.

2. OBJECTIVES

1. To help arouse the feeling of constructive competition among children.
2. To help generate thinking power in children.
3. To lead and inspire children to create new ideas.

3. MATERIALS USED

A sheet of paper, a thin bamboo strip, colour set and paste.

4. HOW TO MAKE

1. Place a bamboo strip on the edge of the paper and fold it 2 or 3 times. This will make one end of the paper heavier than the other. See Figures 1 and 2.
2. Make a tube by rolling the paper as in Figure 3.
3. Paste the edge to hold the paper tube in place. See Figure 4.
4. Decorate the tube with mathematical symbols or other desired designs.
5. The tube is now ready for flying.

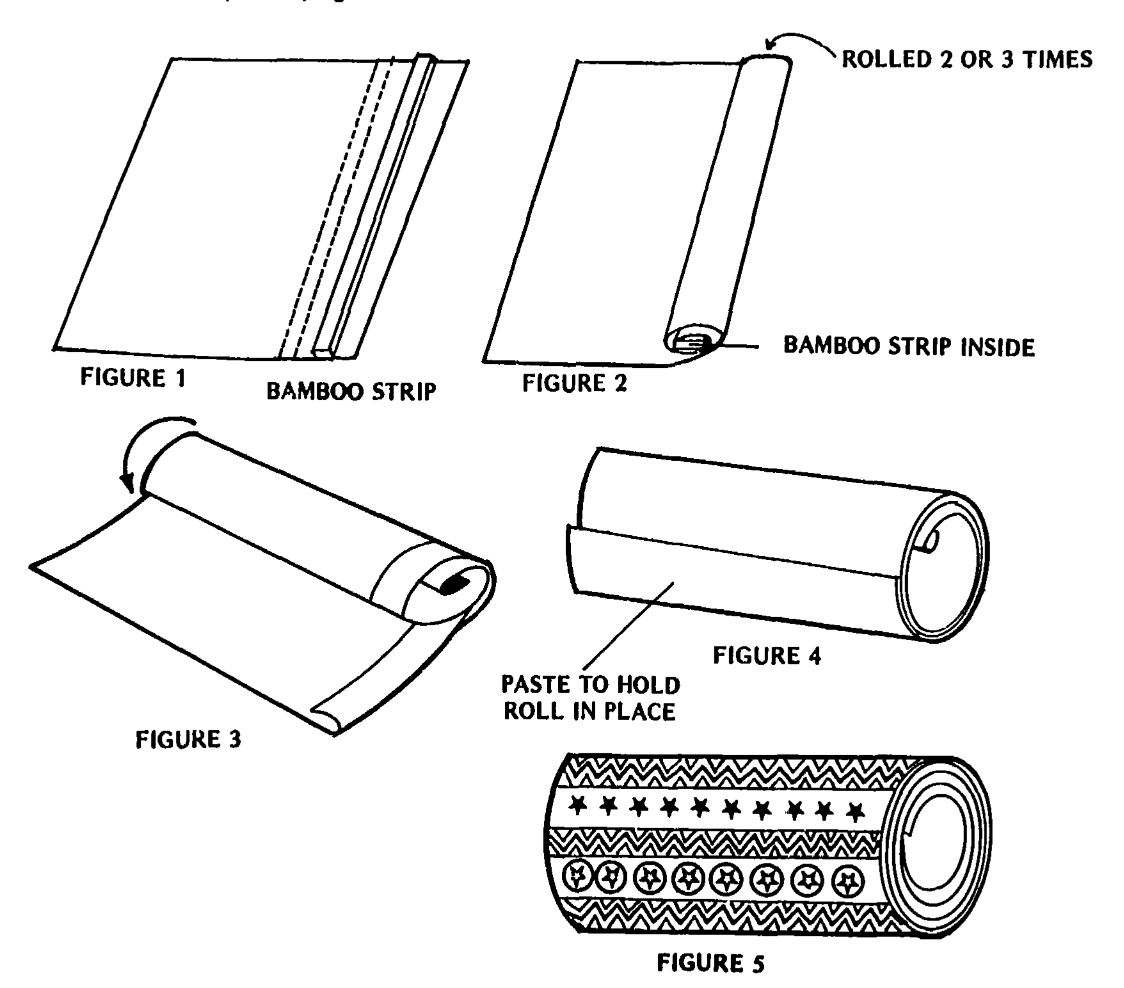


FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4

FIGURE 5

5. HOW TO USE

Children usually make flying tubes in their art classes. During recess or lunch break, they play with their flying tubes in the playground or wide open spaces.

They play a game of trying to see whose flying tube can fly farthest. They also play the fly-and-catch-it game with it.

6. MODIFICATION

1. If no bamboo strip is available, paper clips may be used in its place.
2. Pieces of rubber band may keep the paper tube in shape if there is no paste available.
3. Encourage the children to paint and decorate their flying tubes. This will help develop their art skills.

Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 22

MAKE SENSE SENTENCE – A CARD GAME

1. BRIEF DESCRIPTION

A pack of cards containing some principal nouns and verbs. Each card has a score. The idea of the game is to make meaningful sentences. Usually useful in teaching English as a second language.

2. OBJECTIVES

To provide an opportunity for children to improve their English.

3. MATERIALS USED

A pack of 54 cards (may be made from empty cigarette-packets (or cut from cardboard).

4. HOW TO MAKE

Collect or make 54 cards 4 cm x 7 cm in size.

Write on each card suitable nouns and verbs and mark the score for each card similar to the table show below:–

WORD	NO. OF CARDS	SCORE FOR THE WORD
I	3	2
WE	2	3
YOU	3	3
HE	3	2
THEY	2	3
WAS	2	1
WERE	1	2
IS	1	1
AM	2	1
ARE	1	1
HAD	1	3
HAS	1	3
HAVE	2	3
SEE	1	1
SAW	1	1
SEEN	1	2
TAKE	1	1
TOOK	1	1
TAKEN	1	2
GO	1	1
WENT	1	1
GONE	1	2
EAT	1	1
ATE	1	1
EATEN	1	2
SHOW	1	1
SHOWED	1	1
SHOWN	1	2
CLEAN	1	1
CLEANING	1	1
CLEANED	1	2
THE	4	2
A	4	3
AN	2	4
APPLE	1	1

BOOK	1	1
BOY	1	1
HOUSE	1	1
GARDEN	1	1
BUN	1	1
BREAD	1	1
HOME	1	1
SCHOOL	1	1
ELEPHANT	1	1

5. HOW TO USE

1. Four or more players can play this game.
2. Shuffle the pack and deal 3 cards each at a time until all cards are distributed equally (any excess should go to the table with "words down")
3. Each player puts a card on the table until one is able to make complete meaningful sentence. He then keeps the 'sentence' separately with him without mixing with other cards in his hand.
4. When a player is not in a position to make a sentence he may exchange the top card from the excess cards at the centre (if there are any) with one card in his hand.
5. If he could then make a sentence he may keep the sentence aside and add the marks to his score.
6. When no more sentences could be made, each player adds his marks and the one with the highest total wins.

Note: A separate score-card may be useful.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys" prepared by Mr. P.B. Dayasiri, Curriculum Development Centre, Sri Lanka.*

SHEET 23

ACCORDIONETTE

1. BRIEF DESCRIPTION

A series of cards with pasted-on letters and illustrative objects from magazines is strung together with a masking tape so that it can be folded and opened like an accordion. It is a very appealing device to reinforce learning of the alphabet and for vocabulary development.

2. OBJECTIVES

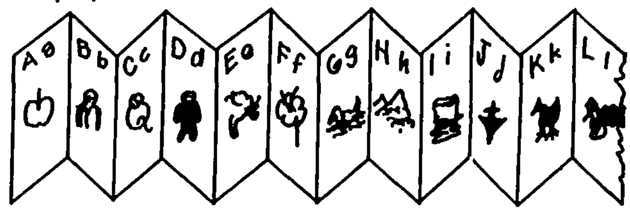
1. To review the letters of the alphabet.
2. To form words using the alphabet as initial letters.
3. To write the capital and small letters of the alphabet.

3. MATERIALS USED

Empty cardboard boxes, a pair of scissors, pictures to illustrate each letter, paste and masking tape.

4. HOW TO MAKE

1. Cut cardboard boxes into 14 cm x 19 cm pieces, or as desired.
2. Paste the cut letters of the alphabet, representing capital and small letters, together with the corresponding pictures to exemplify each letter.



5. HOW TO USE

1. Present the letters from A to Z and let the pupils identify each letter.
2. Pupils identify the object that accompanies each letter.
3. Pupils mention other objects or words to illustrate each letter.
4. They write capital and small letters of the alphabet.

6. POSSIBLE MODIFICATIONS

1. Indigenous materials like guinit (rough textile material), buri mat or abaca may be used instead of cardboards.
2. Letters may be printed instead of cut out.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 24

BAMBOO PICTURE TILES

1. BRIEF DESCRIPTION

These bamboo picture tiles are intended to be used by primary grade pupils in playing an enrichment game after the lesson on "Go, Grow, and Glow" food has been taught. They consist of bamboo chunks with illustrations of different kinds of food on only one side of each piece.

2. OBJECTIVE

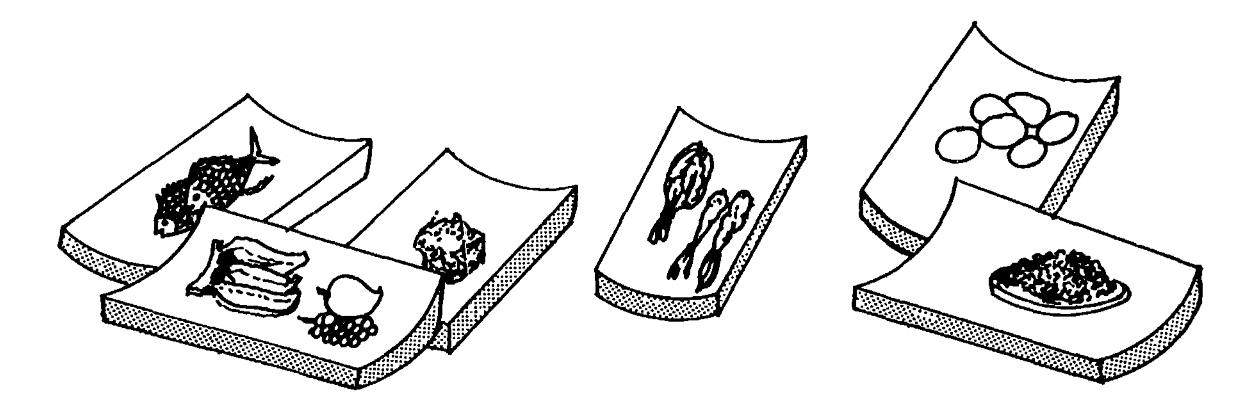
To classify food into three groups – those which make children Go, Grow, and Glow.

3. MATERIALS USED

Bamboo pieces, 5 cm x 7 cm and coloured pentel pens.

4. HOW TO MAKE

Cut the bamboo into 5 cm x 7 cm tiles or pieces. Trim the edges. On the inner side of the bamboo tiles, draw pictures of go, grow, glow food such as meat, fish, vegetables, fruit, rice, corn, etc.



5. HOW TO USE

To play the game, turn the tiles face down. Shuffle them as in a domino game. Give an equal number of tiles to two or four players. The players then open their tiles and classify them into 3 groups as Go, Grow, and Glow foods. The player who classifies the tiles first and correctly, wins the game.

6. POSSIBLE MODIFICATIONS

1. The cut-outs may be taped on the bamboo tiles so that the tiles can be used again and again.
2. The tiles may be used also for other lessons on foods, nutrients and food sources.
3. Match boxes or wood discards can be used as tiles instead of bamboo chips.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 25

CATCH THE ANSWER

1. BRIEF DESCRIPTION

This is a device that provides practice in mathematical problem solving and the fundamental operations.

2. OBJECTIVE

To give accurate answers to mathematical problems.

3. MATERIALS USED

2 sheets of Manila paper, pentel pens or crayons, 80 cm x 80 cm ruler, 2 sticks each 50 m long and tagboard for the mitts.

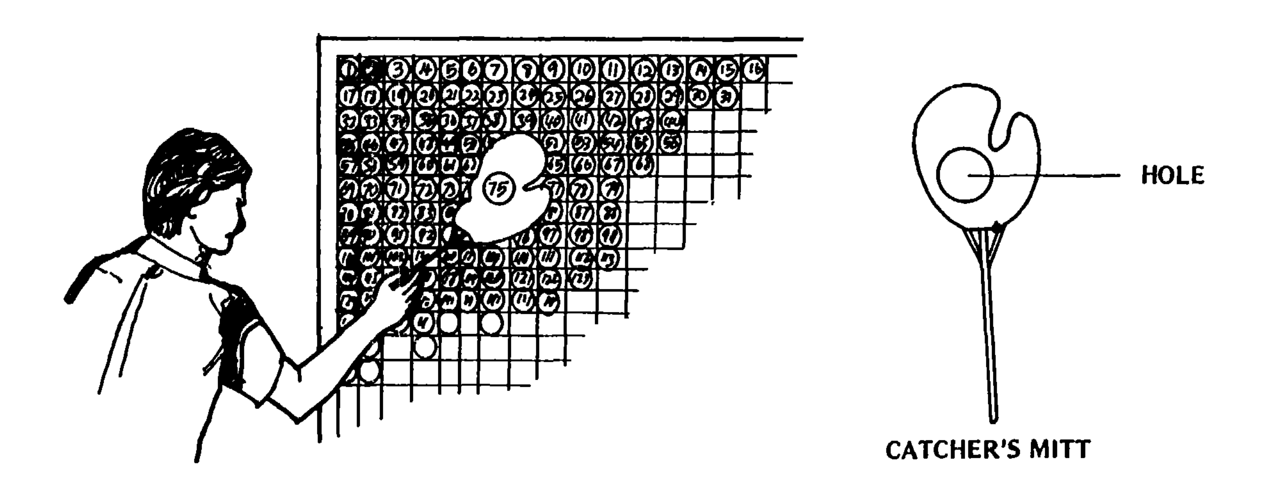
4. HOW TO MAKE

Draw a 75 cm square on the Manila paper. Divide the square into 100 small squares. Write 1 to 100 on the squares consecutively. Make two squares with numbers. Draw two catcher's mitts on a tagboard. Cut them out and attach to two sticks.

5. HOW TO USE

Hang the numbered paper on each end of the chalkboard. Divide the class into 2 teams. Give the first 2 players the catcher's mitt and let them stand by the board. "Throw" a question to the class and the 2 players give the answer by "Catching" the number on the paper. (See illustration). The first player to get the right answer gets a point for his team. This is an exercise of speed and accuracy.

This game is intended for all levels. It provides drill on problem solving involving the basic operations.



6. POSSIBLE MODIFICATIONS

If a numbered paper is not available, draw the numbers on the chalkboard. The teams may take turns in giving the problems to the two contestants. It gives them opportunity in framing simple problems.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 26

THE CODED MESSAGE GAME

1. BRIEF DESCRIPTION

This device is used in a game in which pupils are asked to determine the coded message in a card containing the indicated operations that represent letters in the alphabet as written on the cardboard strip. This can be used for drill on the four fundamental operations from Grades IV to VI and for integration of other curriculum imperatives with mathematics.

2. OBJECTIVES

1. To perform the four fundamental operations with accuracy and speed.
2. To read sentences correctly.
3. To paraphrase sentences.

3. MATERIALS USED

Empty cigarette boxes, pair of scissors, pentel pen and paste.

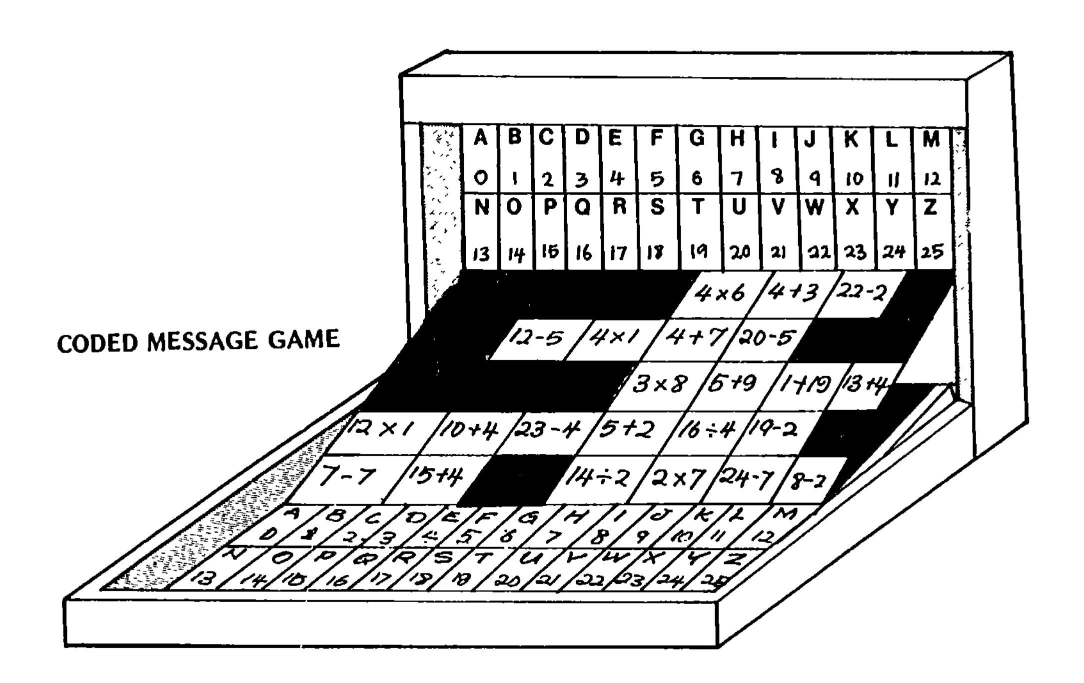
4. HOW TO MAKE

1. Make 5 rectangular pieces with dimensions 4 cm by 13 cm and 5 pieces measuring 10 cm by 14 cm out of empty cigarette boxes.
2. On each of the 4 x 13 cm strips write all the letters of the alphabet and below every letter write the whole numbers consecutively beginning with O corresponding to A and ending with 25 corresponding to Z.

A	B	C	D	E	F	G	H	I	J	K	L	M
0	1	2	3	4	5	6	7	8	9	10	11	12
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
13	14	15	16	17	18	19	20	21	22	23	24	25

			4x6	11+3	22-2	
	12-5	4x1	4+7	20-5		
			3x8	5+9	1+19	13+4
12x1	10+4	23-4	5+2	16÷4	19-2	
7-7	15+4		14÷2	2x7	24÷2	8÷2

3. Write 5 messages to be coded in the 10 x 14 cm cards. (Consider the number of frames in the card when deciding on the message).
4. Draw 2 cm squares on each of the 10 x 14 cm cards (Message Cards). Determine the letter that should go into each frame or square leaving one or more empty squares/frames in between words. The empty frames are shaded.
5. Represent each letter in every frame with an indicated operation whose answer is equal to the number corresponding to the letter as shown in the alphabet strip.



CODED MESSAGE GAME

5. HOW TO USE

1. Form 5 groups of pupils.
2. Give to each group a set of alphabet strip and message card.
3. Tell the pupils that each card contains a message and they should find out what it is, making use of the alphabet strip.

6. POSSIBLE MODIFICATIONS

Other indicated operations may be used depending on the level of the pupil who will use the device. The messages to be coded will depend on what curriculum imperatives are to be integrated. The size of the message card may be enlarged for longer messages.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 27

COMPOUND DOMINO

1. BRIEF DESCRIPTION

The word blocks are made of bamboo chunks with simple words written on each. Such words could be matched to form compound words.

2. OBJECTIVES

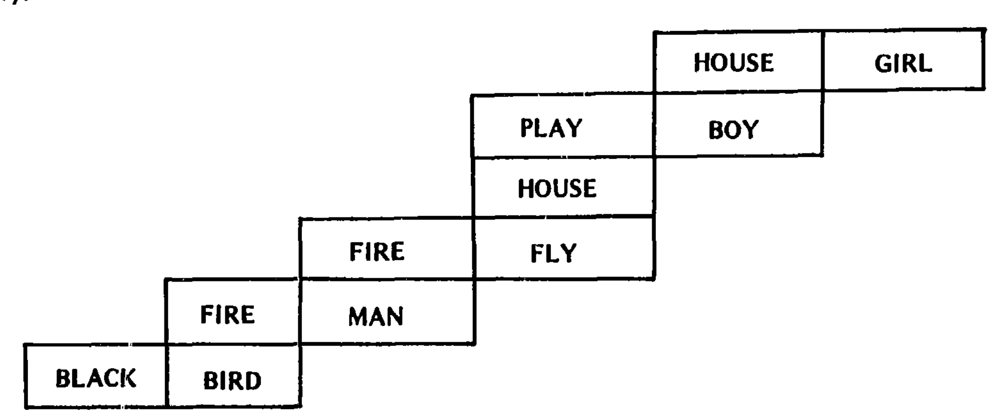
1. To develop skills in forming compound words.
2. To enrich children's vocabulary.

3. MATERIALS USED

Pentel pens and crayons and thirty to fifty pieces of (2.5 cm x 5 cm) bamboo chunks.

4. HOW TO MAKE

Print one simple word on each chunk. Select those words which could be paired to form compound words. Example: Houseboy.



5. HOW TO USE

Use the chunks as dominoes. The sides with the words should be faced down. These materials are used as dominoes. The chunks with words faced down should be distributed equally to 10 pupils. The first person starts with one chunk and anyone with a matching word may pair it to form a compound word.

6. POSSIBLE MODIFICATIONS

This game can be played like "BUILD ME." Empty match-boxes covered with coloured paper may be used for each simple word.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 28

CONCENTRATION CARDS

1. BRIEF DESCRIPTION

This device is patterned after an American TV programme called "Concentration." The concepts or skills that can be pursued with this game are limited only by the teacher's imagination.

2. OBJECTIVE

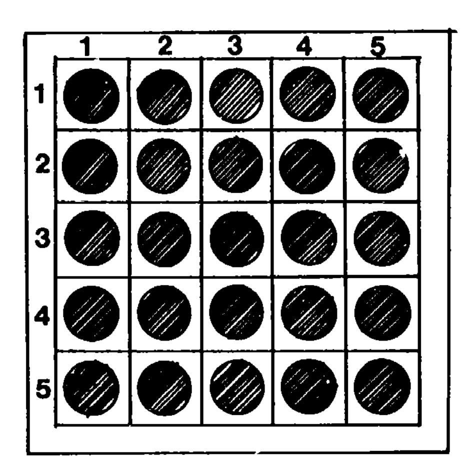
To reinforce skill in multiplication.

3. MATERIALS USED

60 cm x 60 cm tagboard, pentel pens and 25 number cards out of "guinit" (coconut bark).

4. HOW TO MAKE

1. Cut the tagboard to desired size.
2. Prepare 25 pieces of number cards, made from guinit (rough textile material). Whole numbers are written or attached on one side of these cards. The cards in turn, are hung on the board in such a way that the numbers are not seen when hanging but are visible when turned over. The space arrangements are such that a turned-up card does not cover another card.
3. The rows and columns are numbered so that a pupil selects a card to be turned up by choosing an ordered pair of numbers. (See figure below).
4. Choose 25 whole numbers to compose a large number of multiplication facts, utilizing three numbers on three cards. Hang the cards at random.



5. HOW TO USE

1. Divide the class into 2 teams and each team into sub-groups of 2 or 3 players each. Alternate play from team to team and rotate among the sub-groups.
2. Each group selects 3 cards to be turned up by choosing an ordered pair of each card. They make a product (state a multiplication fact) using numbers on those 3 cards. If they are successful, their team scores a point, and all cards are turned down for a second or next set of players.
3. If it is not possible to make a product, the cards are turned down and the play moves on to the other team.

4. If a product is made, then that particular product and its commutative counterparts are not to be used again. They should be written on the chalkboard for all pupils to see. But one or two of those numbers can be used to form a different product in another situation.

   Example: If a group gets 6, 2, and 12, the combination, 6 x 2 = 12 or 2 x 6 = 12 cannot be used again; but if a group finds 3 and could recall the location of 6 and 2, then they could score with 2 x 3 = 6.

This game is intended for pupils from the fourth grade up. It is played by groups, with individuals in each group taking turns. It can serve as a warm-up activity for a unit on graphs. The notions of ordered pairs of numbers representing points and perpendicular lines as references are basic essentials of graphs.

6. POSSIBLE MODIFICATIONS

1. Discarded materials such as thick calendars can be used as boards for this game.
2. Ginit can be substituted with ordinary cartolina, empty boxes of cigarettes, tissue paper and boxes for the number cards.
3. You can have a 7 x 7 array or any array to suit your grade level.
4. Variation in the game: A sub-group may pass on their third choice of a card during their play if the 2 numbers already showing suggest that a successful third choice is very unlikely. You may permit a challenge from the opposing team to an attempt to make a product or a failure to recognize one, and award or take away a point depending on the outcome of such effort.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 29

DRILL WHEEL

1. BRIEF DESCRIPTION

— This drill wheel can be used from Grades I to VI in connection with addition, subtraction and multiplication of numbers.

2. OBJECTIVE

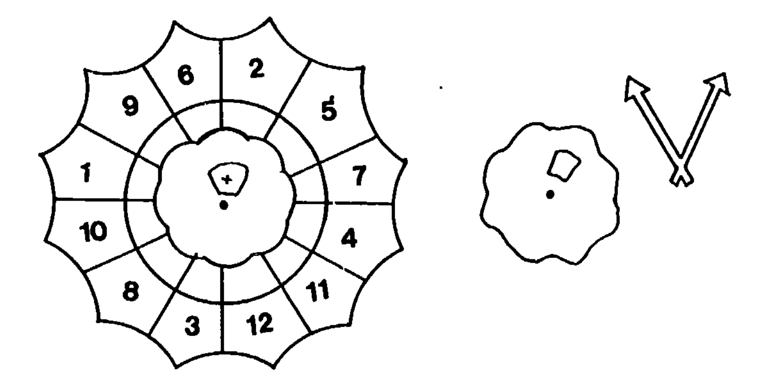
To perform addition, subtraction and multiplication of whole numbers with speed and accuracy through games.

3. MATERIALS USED

An old cardboard, cartolina (thin cardboard) or any plain paper, numbers cut from old calendar, fastener, paper, glue and a pair of scissors.

4. HOW TO MAKE

Cut out a circle of about 60 cm in diameter from a piece of cartolina. Paste it on a cardboard to make the wheel sturdy. Divide the circle into twelve equivalent parts. Paste the numbers along the edge of the circle in any random order. Place the the two pointers, the symbols of operations and a small circle with a window at the centre. Fasten them with a fastener.



5. HOW TO USE

Fasten the centre of the wheel on the board to allow the wheel to rotate in any direction. If addition is to be drilled, show the addition symbol through the window. Then perform the operation on the two (2) numbers indicated by the pointers. Do the same with other operations.

6. POSSIBLE MODIFICATION

Use discarded or old plywood, wooden boxes, tin can, and carton instead of cartolina.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 30

FISH RACE

1 BRIEF DESCRIPTION

This is a race using the fish cut-outs and books. It is very useful in introducing the concept of measurement.

2. OBJECTIVES

1. To compare distances.
2. To measure the distance using an arbitrary unit.

3. MATERIALS USED

5 or 6 fish cut-outs from coloured paper or old magazines, crayons and old books.

4. HOW TO MAKE

Draw 6 fish of the same size on pieces of paper. Cut out the drawings.

5. HOW TO USE

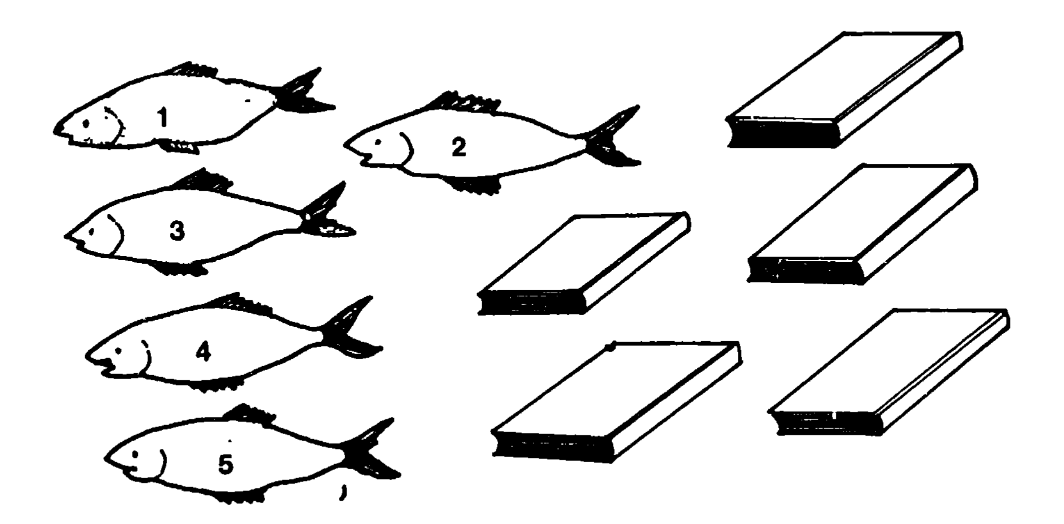
Divide the class into 5 or 6 teams. Get one player from each team. Give each team a book and a fish cut-out.

Mark a starting line on the floor. Let each player lay his/her fish on the line. Get a piece of chalk and encircle the fish. Mark each with a letter or number. On the signal "Go" each player flips the pages of the book several times as fast as he can behind the fish cut-out. The air from the book causes the fish to jump forward. When the time is up, all the players stop. Compare the distances covered by their fish. Each team measures the distance using any arbitrary unit of measure, e.g. ballpen or pencil. The fish that covers the longest distance is the winner.

The game is intended for Grades I and II in developing the concept of measurement and distance.

6. POSSIBLE MODIFICATION

For the upper levels, use a unit like meter, yard, or feet in measuring the distance covered by the fish. The players may take turns in letting the fish "jump".



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 31

"FORMIT" BLOCKS

1. BRIEF DESCRIPTION

The blocks are discarded empty tissue paper boxes made into instructional materials. Words, pictures or phrases on strips of cartolina (thin cardboard) are used with these boxes.

2. OBJECTIVE

To form generalization from a series of experiences on certain topics or ideas.

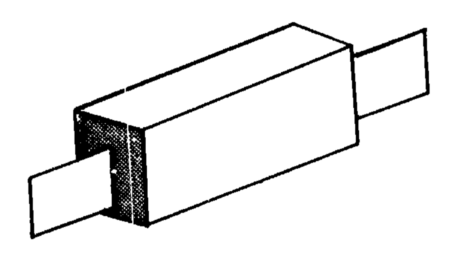
3. MATERIALS USED

Discarded boxes of tissue-paper, pentel pens, strips of cartolina and colored pencils.

4. HOW TO MAKE

Every tissue paper box has an oval hole on the front side. This oval hole is utilized as a screen for the picture or concept the teacher would like to develop.

To utilize the box, make a slit at each end of the box where the cartolina strips should pass through. See figure below.



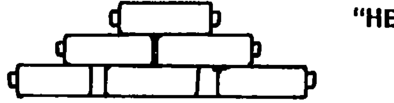
Pictures or words or phrases about the lesson are drawn or written on the cartolina strips. If pictures are used to express ideas, the set must all be in pictures. If phrases are used, the whole set must all be in phrases; if sentences are used, the whole set must be in sentences.

5. HOW TO USE

The "Formit" blocks are used to help pupils formulate generalizations or develop concepts.

There should be as many blocks as there are related ideas to form the generalization.

The pupils are called upon to file the blocks starting from the related ideas shown in the box, to the generalization or the "head" block.



"HEAD" BLOCK-THE GENERALIZATION

THE RELATED IDEAS

6. POSSIBLE MODIFICATIONS

Any box will do, provided it is constructed the way it is described in this sheet.

The blocks may be used in any subject area in all grade levels, with the appropriate pictures or words, phrases or ideas on the cartolina strips.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 32

GUESS WHO

1. BRIEF DESCRIPTION

This "Guess Who" material is made of cut-out pictures of people of different nationalities. The cut-outs are arranged into a triangle in front of which stands the globe.

2. OBJECTIVES

1. To project people from different countries (to the children).
2. To assist in identification lessons.

3. MATERIALS USED

Triangular base board, pictures of people of different nationalities, small pieces of stones, dyed biraho (or sugarcane stalk) and empty panty-hose container.

4. HOW TO MAKE

1. Cut out pictures of people of different nationalities.
2. Paste tagboard at the back of each picture to make it stand.
3. Let it stand on a platform where small stones had been evenly arranged.
4. Place the globe inside the triangle of cut-outs.

5. HOW TO USE

Use it in:

1. An identification lesson of peoples of other nations.
2. Differentiation of costumes.
3. Celebration of United Nation's Week.

6. POSSIBLE MODIFICATION

The cut-out may be placed inside an empty milk box. Use puppet dolls dressed in different costumes.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 33

GUINTO (GOLD)

1. BRIEF DESCRIPTION

This is a modification of the scrabble game. Numbers are used instead of letters. The object of the game is to score as many points as possible by making the sum equal to multiples of five. Styrofoam "tiles" are used.

2. OBJECTIVE

To acquire mastery in adding and identifying multiples of five.

3. MATERIALS USED

Styrofoam pieces, pentel pens and a sharp knife.

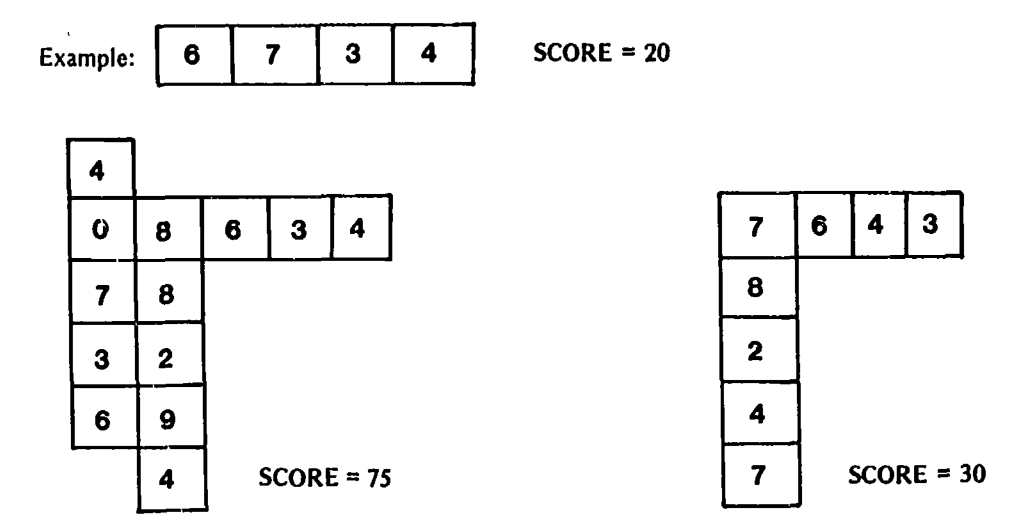
4. HOW TO MAKE

1. Make 88 pieces of tiles out of styrofoam.
2. Number the tiles according to the following:

0 = 7 pieces	5 = 6 pieces
1 = 6 pieces	6 = 9 pieces
2 = 6 pieces	7 = 14 pieces
3 = 6 pieces	8 = 12 pieces
4 = 10 pieces	9 = 12 pieces

5. HOW TO USE (2, 3, or 4 players)

1. To start, turn all tiles, face down. Each player turns over one tile. The game starts with the person having the highest numbered tile and proceeds clockwise from him. Each player then selects five tiles from the file.
2. The first player may use his tiles as long as the sum of the numbers on those tiles is equal to a multiple of five.
3. Each succeeding player must add to one or more tiles already played. All tiles set down during a turn by any player must form one line of tiles in horizontal or vertical direction. There may not be more than five tiles at one time. Tiles played during a turn may be placed parallel or perpendicular to one or more previously played tiles.
4. After each game, a player picks up an equal number of new tiles as those played so that the number of tiles in one's hand is always five.
5. Each person's score consists of the sum of tiles played, including those previously played tiles. Tiles at intersections are counted both ways. Do not count an adjoining row of tiles unless there is an added tile or tiles to that row.
6. The game ends when one player is out of tiles and there are no more tiles left to be drawn. The sum of tiles in a player's hand is subtracted from the player's score. The player who has the greatest number of points wins.



This game is played in Grades 4, 5 or 6 depending on the sums agreed upon by the players.

6. POSSIBLE MODIFICATION

Styrofoam may be substituted with small pieces of wood, tagboard or bamboo chips.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 34

JIGSAW MAP

1. BRIEF DESCRIPTION

An outline map of the Philippines with the boundaries of the provinces shown. The jigsaw pieces are the provinces with the names printed on them.

2. OBJECTIVES

1. To familiarize the children with the outline of the country.
2. To develop the skill in locating and naming the regions and provinces in the country.

3. MATERIALS USED

Buri (palm) mat, tagboard, old calendars, water colour or crayons, felt-tipped pen, masking tape and carbon paper.

4. HOW TO MAKE

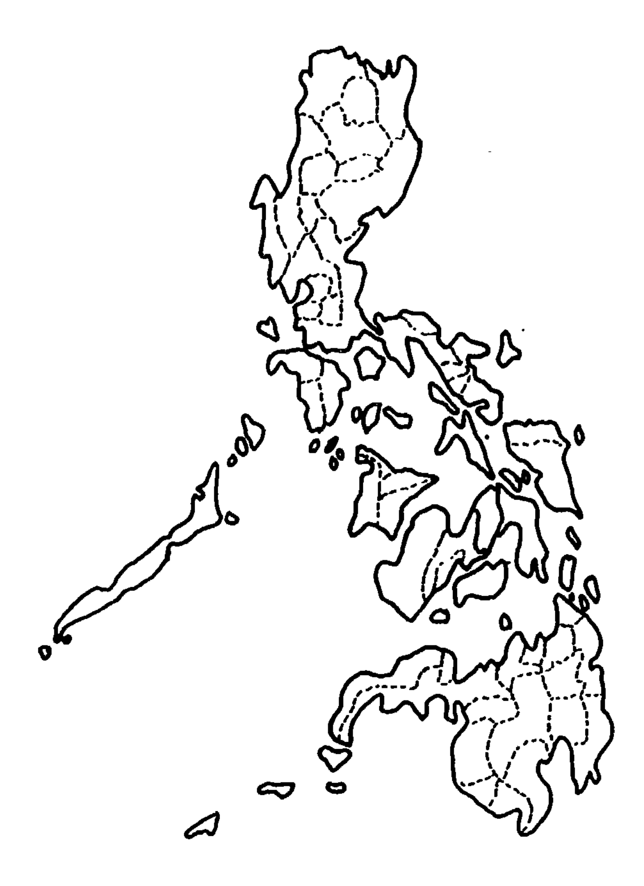
1. Transfer the outline of the map of the Philippines on a buri mat with carbon paper.
2. Trace the outline of the whole map (including the outlines of the provinces) on the tagboard.
3. Print the name of each province on the map mentioned in 2 above. Colour each group of provinces (Luzon, Visayas, Mindanao) in different colours.
4. Cut out the provinces from the prepared map.
5. Put a ring of masking tape at the back of each cut-out province.

5. HOW TO USE

1. Skill in location – Children locate and stick to the outline map, the different provinces by comparing the shapes of the cut-out to the outline as shown in the outline map. The jig-saw map need not be completed in one lesson but may be filled in as the lessons on the different regions progress.
2. Other uses – The children may be asked to:
   a. Stick on the outline map the provinces where they come from or the provinces which they have visited.
   b. Stick on the outline map the provinces that belong to each of the thirteen (13) regions in the country.
   c. Stick on the map the rice growing provinces; the coconut provinces; the abaca (strong fiber) provinces, etc.
   d. Trace the route from Manila to Baguio by attaching the provinces one passes through as one goes from one place to another.
3. As a product map – Pictures of products may be attached to the particular provinces where they are grown just like the jigsaw provinces. Pictures may also be arranged on the sides of the outline map and attached with strings and pins to the provinces where they are produced.
4. As an Ethnic Map – Drawing of the different ethnic groups may be prepared and attached to the provinces or regions where they are mostly found.
5. Historical, Scenic Spots Map – Old postcards or clippings of these places may be arranged around the outline map and attached with strings to the places where they are located.
6. Physical Map – Symbols for the different land forms and water forms can be drawn and attached to the areas being studied. This will give the children an idea of the topography of the place being studied. Topography can be related to the climate, natural resources, occupations, etc. of the people in the place.

6. POSSIBLE MODIFICATIONS

For permanent use, the outline map should be drawn on plywood or on a fibre board. The sets of cut-outs should be classified and filed for ease in locating and identifying them when needed.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 35

KNOCK ME OUT

1. BRIEF DESCRIPTION

This is a modification of a bowling game.

2. OBJECTIVE

To answer with speed and accuracy exercises in addition of two or more one-digit numbers.

3. MATERIALS USED

Empty containers, mimeographing ink, pentel pens, used stockings, glue and sawdust.

4. HOW TO MAKE

Make ten bowling pins out of empty cases of mimeographing ink. Glue and cases together. Glue the base of each pin on a tagboard. Number the pins, 0 to 9. Make a ball out of used stockings and sawdust.

5. HOW TO USE

Set the bowling pins in a triangular form with numbers 0 to 9 arranged consecutively. Mark a short line 10 feet away from the pins. The first player stands on the line as he tries to hit the bowling pins.

To score the game, count the pins knocked down and add the numbers together. The players take turns in hitting the pins.

The player or the team with the highest score is the winner.

This game is intended for levels I and II pupils, in the addition of two or more one-digit numbers.

6. POSSIBLE MODIFICATION

The game may be used in the upper levels by changing the one-digit numbers to 2 or more digit numbers, to make the addends appropriate to the grade level of the children.

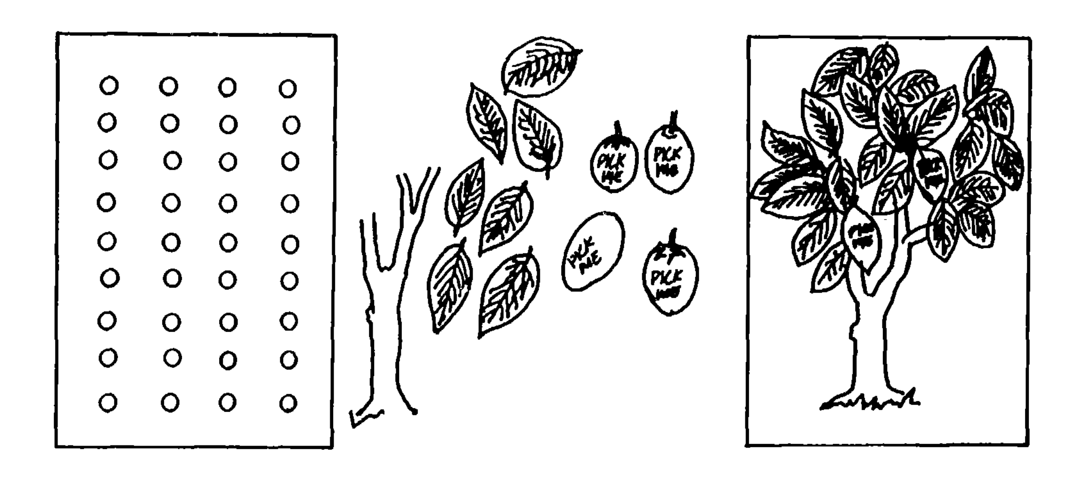
Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 36

THE MAGIC TREE

1. BRIEF DESCRIPTION

It is a paste-up of a tree with cut-outs of different fruits. The cut-outs are attached to the tree with paper-clips. At the back of the fruits are the materials for the drill or review lesson. "Pick Me" of the Filipino translation are printed on each fruit.



2. OBJECTIVE

To provide or review exercises in any of the subject areas.

3. MATERIALS USED

Tagboard (or illustration board or any recycled board), tree bark (or guinit or gugo, or cartolina for the trunk), nipa palm (or art paper, dried leaves or cloth for the leaves), paper clips, felt tipped pen, water colour, crayon or any colouring material, picture of fruits drawn (or cut-out from magazines) and glue.

4. HOW TO MAKE

1. Cut out holes small enough for paper clips on the tagboard.
2. Cut out the trunk of the tree from the tree bark and paste it on the tagboard.
3. Cut out leaves from nipa palm and paste them on the board as parts of the tree.
4. Insert paper clips in the holes made on the tagboard.
5. Cut out fruits from the colored paper.
6. Write mathematical combinations at the back of the fruit cut-outs.
7. Print the word "Pick Me" or "Pitasin Ako" on each fruit cut-out.
8. Attach each fruit cut-out to the board with the paper clips.

5. HOW TO USE

1. Drill exercises in any of the fundamental mathematical operations. Each child picks a fruit and answers the combination at the back of each cut-out.

2. Vocabulary building – Root words are printed at the back of each fruit. The pupil who picks it gives a derivative. A suffix or prefix is printed at the back and the pupils give a word to which the suffix and prefix can be added.

3. Grammar – A singular noun is printed at the back. The pupils give the plural; a word is written and the pupils give suitable modifier or modifiers.

4. Elementary agriculture/home economics – Recognition of the different kinds of fruits, their colours when they are harvested and preserved, their characteristics, etc.

6. POSSIBLE MODIFICATIONS

So that the fruits need not be changed everytime, a different lesson is to be drilled or reviewed, lesson materials can be printed on separate scrap cards and attached to the fruit with the tapes.

The tree trunk as well as the fruits and leaves can be cut out from scraps of cloth or magazines and the combinations or drill exercises may be pasted on each fruit. Sets of fruits can be prepared for each set of drill lessons. The teacher's resourcefulness and imagination with the pupil's cooperation can go a long way in modifying the construction and use of this "Magic Tree" to suit the instructional needs of the class.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 37

MATCHING BOARD

1. BRIEF DESCRIPTION

Made of light materials, this instructional aid is a multi-purpose one. This is designed to monitor drills, reviews, games, initiating a unit, and even administering short quizzes. This material gives new life and style in presenting the above-mentioned activities in the classroom.

2. OBJECTIVE

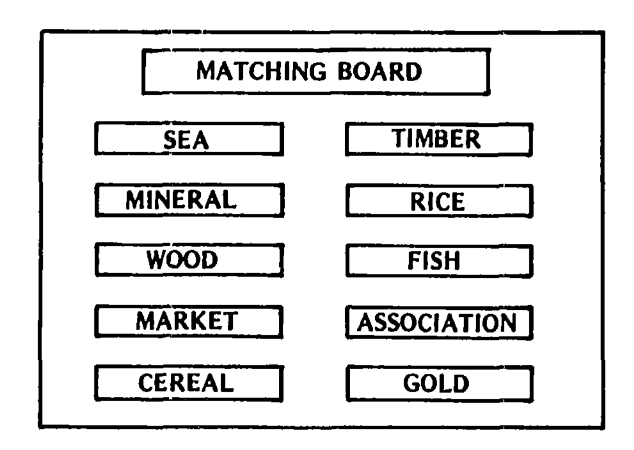
To identify and match personages, events or places accurately.

3. MATERIALS USED

1 black tagboard, cartolina (thin cardboard) strips to serve as cards, half sheet of yellow cartolina and pentel pens.

4. HOW TO MAKE

Make ten rectangular cuts (yellow cartolina) with 3½" width and 6" length. Make a 2¼" by 4½" window slit on each of the rectangular cut. Fold the sides of length into a ¼" and fold sides inside, leaving 1/8" thick on the sides. This gives space for inserting any material to be learned.



5. HOW TO USE

Pupils match and manipulate the cards on the right till they find the corresponding answer to each of the card on the left. In case of a short quiz, write numbers 1–5 on the left, opposite each pocket. On the right, write letters a–e before each pocket. Pupils may be asked to match the cards on the right against the cards on the left by writing the letters only. This matching board may also be used in other activities as the teacher may deem proper and necessary.

6. POSSIBLE MODIFICATIONS

1. For the black tagboard, a white nylon burlap or an old calendar may be used
2. Scraps of cloth may be used for the pockets.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 38

MASTER ME

1. BRIEF DESCRIPTION

This device is used to display troublesome basic facts for remediation and/or practice.

2. OBJECTIVE

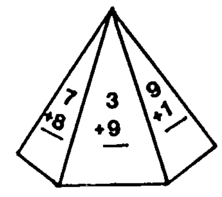
To answer accurately and with speed the facts which one finds difficult.

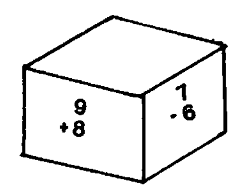
3. MATERIALS USED

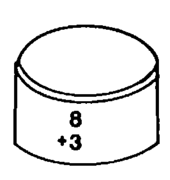
Cartolina (thin cardboard), protractor, pentel pen, ruler, pair of scissors and compass.

4. HOW TO MAKE

1. With the aid of a compass and a protractor make a regular octagon whose side is 5".
2. Remove three faces leaving a narrow flap adjacent to the fourth face.
3. Fold the edges and paste the flap to the last face so as to form a five-sided pyramidal shape.
4. On each side, write combinations which many pupils find difficult to answer.







5. HOW TO USE

1. Place the device on a table or at a convenient place visible to the children who have not mastered the facts.
2. Let them answer the facts.
3. Leave the device on display for further practice until mastery is achieved.

6. POSSIBLE MODIFICATIONS

1. This device may be used in other grades.
2. Instead of writing the facts directly on the sides of the pentagonal pyramid, pockets may be made near the base of each side and cards containing the difficult combinations are inserted in the pockets. Other combination cards may be used if need arises for a change.
3. Scraps of wood, cardboards, cans and shoe-boxes may be used instead of cartolina.
4. Other shapes may be formed out of the different materials suggested.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 39

MECHANICAL WAVE GENERATOR

1. BRIEF DESCRIPTION

An improvised device that can be used to illustrate how a mechanical wave is generated using "pendulum oscillation."

2. OBJECTIVE

To illustrate how a mechanical wave is generated using "pendulum oscillation."

3. MATERIALS USED

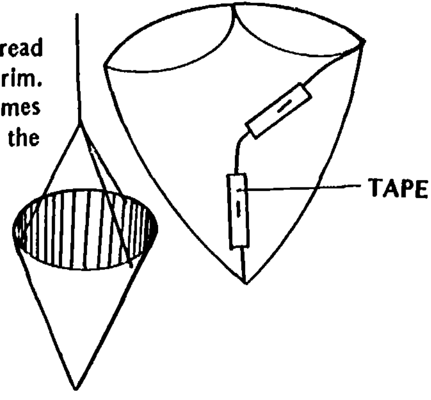
Fine thread (1 meter), cardboard, 4 cm x 8 cm in size, six pieces of pad paper (or bond paper), 8½" x 11" in size, scotch tape (or masking tape), find dry sand of uniform size (1,000 cc), and stand (or 2 chairs) to hold the pendulum.

4. HOW TO MAKE

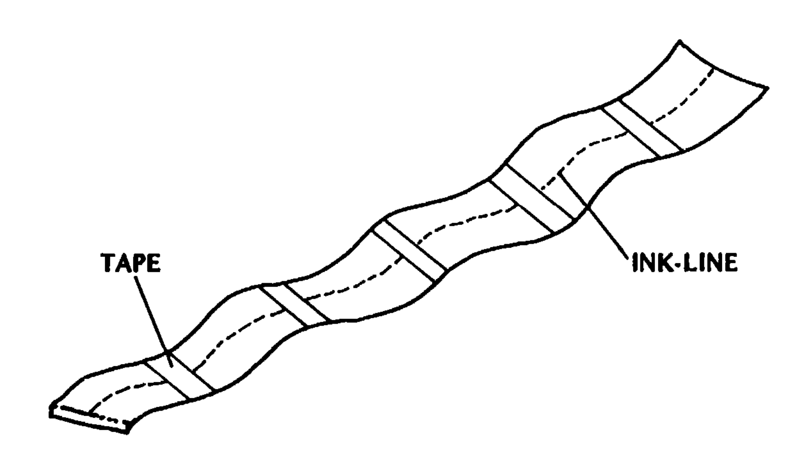
1. Make a conical funnel out of the cardboard as shown below:

   a. Roll the cardboard to taper and tape the edges to hold them in position.

   b. Trim the edges to have a clean conical funnel. Make 3 thread size holes equidistant from each other about ½ cm from its rim. Also cut the tip of the cone to make a hole about 3 times diameter of the grains of sand. Tie the funnel with the thread as shown in the diagram.

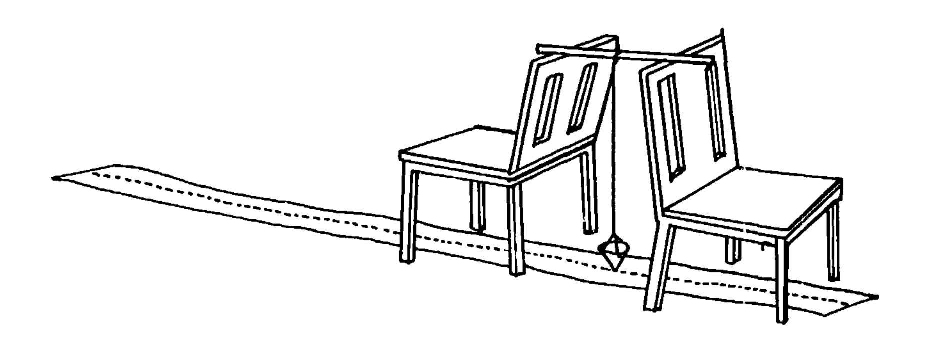


2. Make a long paper strip out of the six pieces of pad paper by taping them end to end as shown below.

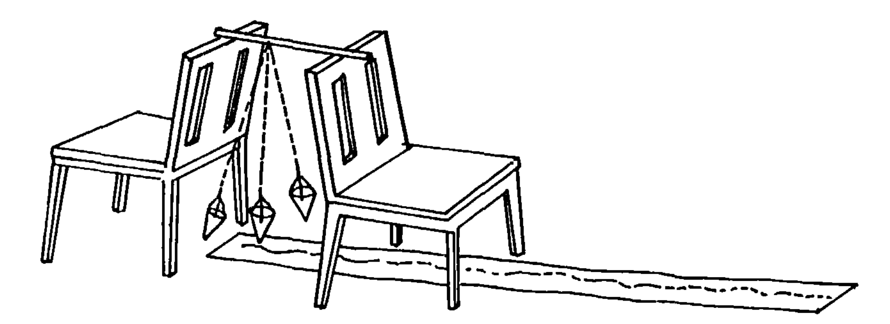


5. HOW TO USE

1. Set up the materials on a stand as shown in the following illustration.



2. Pour the grains of sand into the funnel. While doing this, close the tip-hole of the funnel with one finger. The funnel can now serve as a pendulum bob.
3. Displace the pendulum (funnel) from its equilibrum position by about 5 degrees. Make sure that the equilibrum position of the funnel points approximately at the mid-axis of the paper-strip.
4. Release the funnel and allow it to swing and oscillate in one place.
5. As the funnel swings, pull the paper strip with an approximately uniform speed, until its opposite end comes just under the swinging funnel.



6. Steps 4 and 5 may be repeated three or four times until a uniform wave pattern is produced.

6. POSSIBLE MODIFICATIONS

The set up may be used for pendulum experiments and also as an analogue for simple harmonic motions.

Use: Tin or galvanised iron sheet for the cardboard funnel.
Glue for scotch tape.
Spoiled liquid milk for grains of sand.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 40

METRIC WHEEL

1. BRIEF DESCRIPTION

This device is called a metric wheel because one complete rotation of the wheel from the marked point on its circumference is one meter.

2. OBJECTIVE

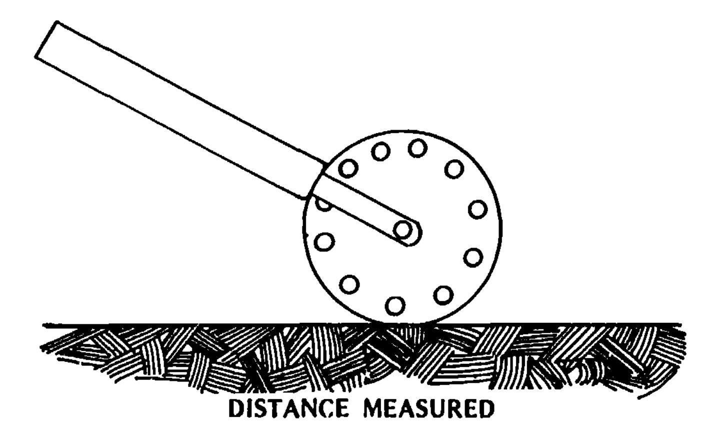
To measure around curves, crooked paths as well as straight distances.

3. MATERIALS USED

A circular piece of wood, bamboo and a ruler.

4. HOW TO MAKE

1. From a piece of wood, make a circular disk with a radius of 16 cm.
2. Attach the centre of the disk to one end of the bamboo handle about 80 cm long.
3. Draw a marker on the outer side of the disk to indicate the starting point on the circumference of the wheel.
4. Attach a piece of flexible bamboo strip that will touch the handle and produce a 'click' after one meter has been traveled.



5. HOW TO USE

1. Make the marker of the wheel coincide with the beginning of the distance to be measured.
2. Count the number of rotations made by taking note of the clicking sound made.

6. POSSIBLE MODIFICATIONS

1. Covers of cans may be used instead of a circular piece of wood.
2. The wheels may be marked with decimeters so that distances less than 1 meter can be measured accurately with this device.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 41

MERRY-GO-ROUND

1. BRIEF DESCRIPTION

This device is used to stress initial sounds, common phonograms and final sounds.

2. OBJECTIVES

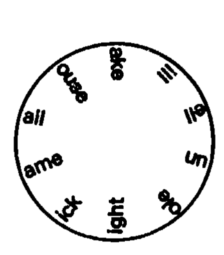
1. To pronounce initial consonant sounds correctly.
2. To form different words by combining initial consonants with different phonograms.

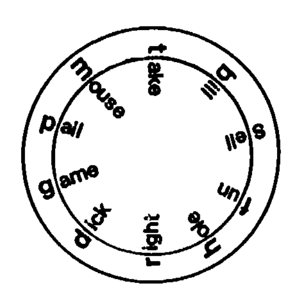
3. MATERIALS USED

Tagboard or any thick material, water color and fastener.

4. HOW TO MAKE

1. Cut two circles, one bigger than the other, from the tagboard.
2. Fasten together through their centers for free rotation.
3. Print coloured initial consonants like f, h, r, d, g, p, m, t, b, s, on the bigger circle.
4. Print coloured phonograms like un, och, ole, ight, ich, ame, ail, ate, ell, ill, all around the edge of the smaller circle so that when the larger circle is rotated, different words can be formed.





5. HOW TO USE

Let the pupils pronounce the initial consonant. Rotate the larger circle so that the initial consonants can be combined with the same phonograms to form different words which are to be read by the pupils accordingly.

6. POSSIBLE MODIFICATIONS

1. The final sound may be given emphasis instead of the initial consonant.
2. Instead of phonograms, pictures of objects may be placed in the smaller circle.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 42

NUMBER JIGSAW

1. BRIEF DESCRIPTION

This is a simplified version of a jigsaw puzzle. It is made up of parts of a picture and number symbols.

2. OBJECTIVES

1. To assemble parts/pieces to form a whole picture.
2. To match correctly the number symbols with their corresponding number names found in the assembled picture.

3. MATERIALS USED

Picture, glue, tagboard, and pentel pen.

4. HOW TO MAKE

1. Draw a picture showing the concept of the number name and number symbol.
2. Paste the picture on a tagboard.
3. Cut the picture into pieces. Start with 6 pieces for Grade I pupils. When the children have already gained the skill in assembling the parts, a picture or figure may be cut into smaller pieces

(See illustration below)

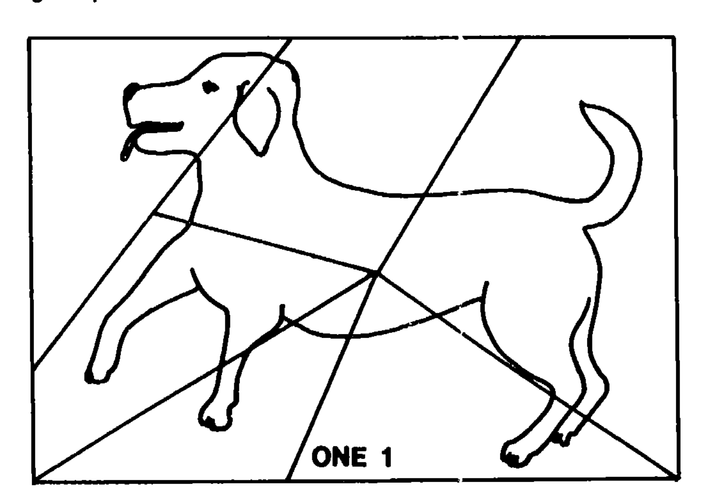
5. HOW TO USE

Show the assembled pieces to the children for one minute. Disarrange the pieces and let one child assemble them to form a complete picture/object within a certain time limit. Other children will take turns in assembling the jigsaw and compare their speed in the activity. A number of jigsaws should be used.

This is intended for individuals. It can be given to pupils who finish their classroom work ahead of the others.

6. POSSIBLE MODIFICATION

For the upper grade level, cut the pictures into smaller pieces to make it more difficult to assemble. Make the time limit for assembling the parts shorter too.



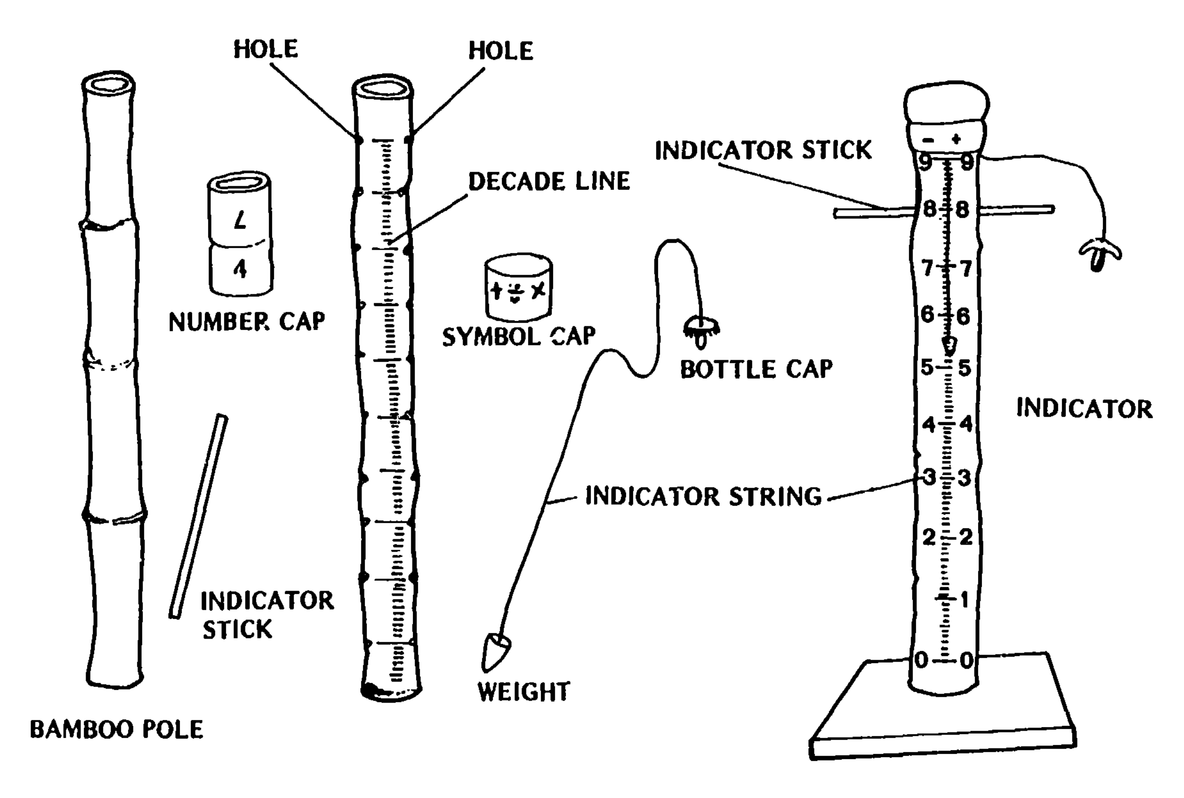
Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 43

NUMERICAL TOTEM POLE

1. BRIEF DESCRIPTION

An upright bamboo pole about 1½ meters high on a wooden base. The numbers 0 – 9 are pasted one decimeter apart from the base to the top. These numbers are the decade lines. In between the decade lines are short lines one (1) cm. apart. Holes are bored on each side of the decade line for a stick indicator to pass through. A string is passed through the holes at the tip of the pole. A small piece of heavy object is attached to one end of the string and a bottle cap on the other end. It has also a cap made of bamboo with numbers 2 – 9. Another cap made of cigarette box with the symbols for the fundamental mathematical operations is made to fit the bamboo cap.



NUMERICAL TOTEM POLE

2. OBJECTIVES

1. To provide drill or review exercises in counting or estimating numbers.
2. To provide practice on the different fundamental mathematical operations.

3. MATERIALS USED

1 piece of bamboo pole about 5 – 7 cm in diameter and 1 – 2 meters high, numbers 0 – 9 cut from old calendars, 1 piece of wooden board for a base about 20 cm square, 1 piece of string made from old nylon stockings about 140 cm long, 1 barbecue stick, 1 piece shell and 1 bottle cap.

4. HOW TO MAKE

1. Clean and polish the bamboo pole.
2. Clean the piece of wooden board and trim to about 20 cm square.

3. Nail the bamboo pole upright to the board.
4. Measure and mark the poles 1 decimeter apart.
5. Bore holes through the poles on the mark 1 decimeter apart.
6. Connect each two opposite holes with a bold line. These are the decade lines.
7. Draw nine short parallel lines at every space one centimeter apart.
8. Number the decade lines 0 – 9 with numbers cut out from old calendars.
9. Bore holes at the top of the pole directly perpendicular to the other holes.
10. Pass a string through the two opposite top holes and on the end which is near the short lines, tie a weight to act as an indicator. This should be something pointed and a little heavy.
11. Close the other end of the string with a used soft drink bottle cap.
12. Prepare a bamboo cap with a bigger diameter than the pole. Paste the numbers 2 – 9 around the cap.
13. Prepare another cap which can be made of an empty cigarette carton with the symbols +, –, x, and ÷.

5. HOW TO USE

A. Drill game on estimating numbers:

The children form two competing groups. The teacher starts the game by dropping the string indicator of the totem pole to the desired number height e.g. the fifth line above the decade line 5. The first pair answers. The child who can calculate first that the indicator is pointing at 5.5 wins and sits down. The other child becomes the "It" and takes the place of the teacher. "It" drops the indicator to the desired number and the next pair tries to give the correct answer. The child who fails to answer becomes the next "It" while the former "It" stands to one side. The game continues until all the pairs have the chance to participate. The group which has the most members seated down, wins the game.

B. Drill on the basic facts of the four fundamental operations:

1. Select a fundamental operation indicated on the box cap at the top of the pole.
2. Select one of the basic numbers on the bamboo cap.
3. Position the caps so that the operation and the basic number are visible to the class.
4. Put the stick indicator through the holes near any of the numbers on the totem pole to form a combination e.g. 4 x 4 =
5. The game proceeds just like the first drill game with the pair of children trying to beat each other in giving the correct answers.
6. The caps may be moved to change the numbers and the operation.

C. Other uses:

1. Initial instructions on a thermometer or a barometer reading may be given through the use of the numerical totem pole. Readings on a thermometer or a barometer may be indicated on the numerical totem pole for everybody to see.
2. Introduction of linear measure may also be done with this device.
3. Lessons on equivalents on linear measure may also utilize the device.

6. POSSIBLE MODIFICATION

Cylindrical heavy cardboard tubes used for rolling textiles may be substituted for the bamboo poles.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 44

PEEP SHOW

1. BRIEF DESCRIPTION

This is a device used to develop keen observation. The pupil peeps through the hole of the styrofoam container and sees something inside which he/she has to talk about.

2. OBJECTIVES

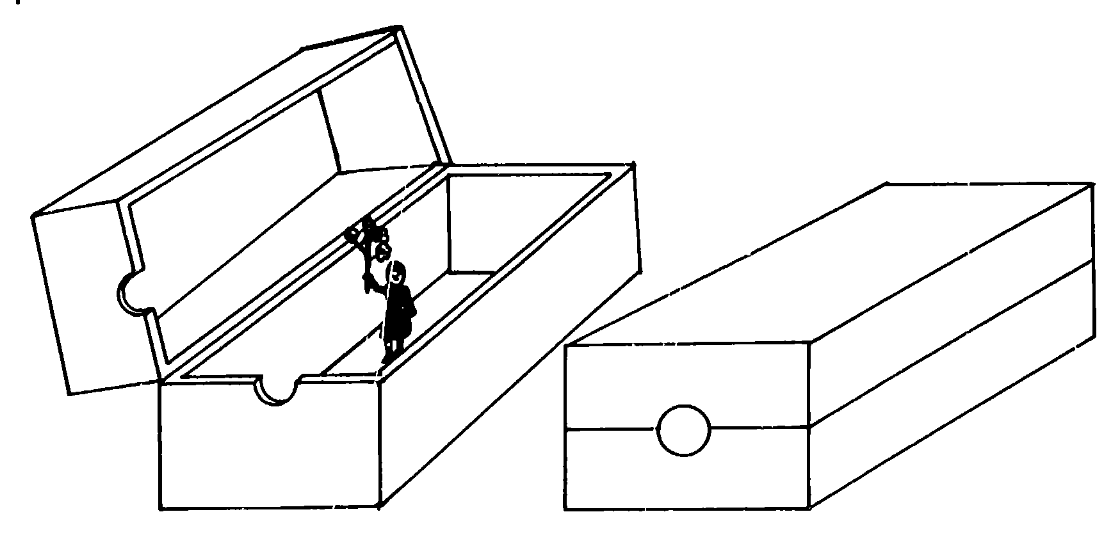
1. To develop keen observation among children.
2. To describe or tell a story about what one has seen.

3. MATERIALS USED

Styrofoam container for multi-print mimeograhing ink, pentel pen and colored pencils and cut-outs which tell a story or an event.

4. HOW TO MAKE

1. Get a discarded styrofoam or throw-away container of multi-print mimeograhing ink. Join the two sides with masking tape. Use colored pentel pen markers to sketch a background scene inside the styrofoam.
2. Cut out figures to be pasted at the middle inside part of the styrofoam. Close temporarily the container with masking tape.



5. HOW TO USE

The pupils peep through the hole of the container to see the objects inside. Then they describe or tell a story about what they have seen in the container.

The pictures or cut-outs should be changed to suit the topics or lesson whenever necessary.

6. POSSIBLE MODIFICATION.

A big bamboo tube about 5" in diameter, or a cardboard cylinder may be used for the peep box.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division. Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 45

PER CENT COMPUTER

1. BRIEF DESCRIPTION

This is a device to aid children in determining what per cent of a number is another number.

2. OBJECTIVES

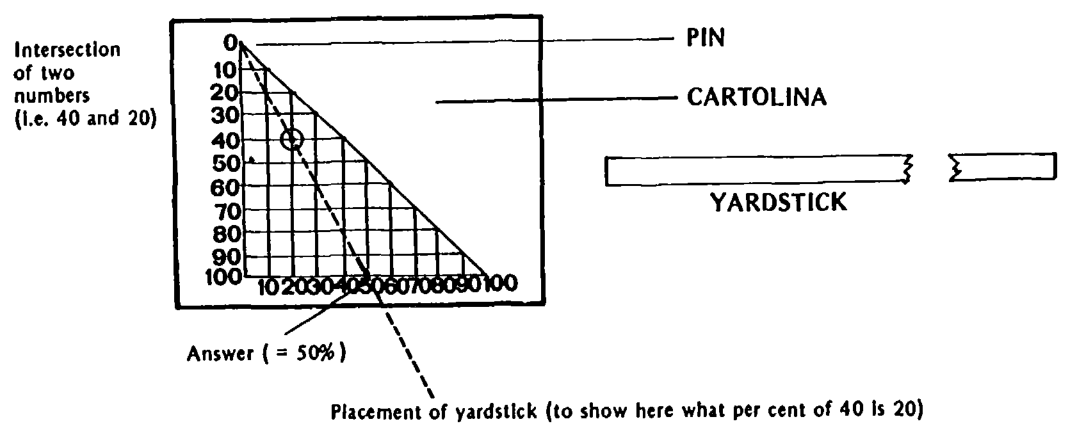
1. To determine what is a certain per cent of a number.
2. To give with reasonable speed what per cent a number is of another.

3. MATERIALS USED

Cartolina (thin cardboard), ruler, pentel pen and pin.

4. HOW TO MAKE

1. Make a right-angle triangle whose legs are equal.
2. On the base and leg have ten equal spaces. Number the lines produced as shown in the diagram.
3. Make a yardstick.
4. Drive a pin at the upper zero point.



Placement of yardstick (to show here what per cent of 40 is 20)

5. HOW TO USE

1. To find what per cent a number is of another, place the yardstick against the pin, with the same side of the yardstick passing through the intersection of the two numbers. The smaller number is read from the base and the larger one from the side.
2. The number at which the yardstick crosses the base is the answer.

6. POSSIBLE MODIFICATIONS

1. Instead of a cartolina, discarded plywood, lawanit (similar to asbestos), tagboard or thick cardboard may be used.
2. The yardstick/indicator may be made of a bamboo strip and the pin may be replaced with a bamboo peg.
3. By reversing the process, the base on the percentage may be found.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 46

PICTURE DOMINO

1. BRIEF DESCRIPTION

This is a variation of the conventional domino. Pictures are used instead of dots on the domino blocks. Bamboo chips are used for the blocks.

2. OBJECTIVES

1. To show correctly number property of pictures.
2. To match correctly pictures and their corresponding number names.

3. MATERIALS USED

Bamboo and colored pentel pens.

4. HOW TO MAKE

Cut the pieces of bamboo into rectangular shapes 1½" x 3". Draw a line dividing the rectangle into two.

Draw pictures on the half part of the rectangle and number symbols on the other half. (Numbers 1 to 6 are used with corresponding 1 – 6 objects in the picture. The set has a total of 36 blocks. The blocks look like this:



5. HOW TO USE

The game may be played by 2, 3, 4, or 6 players. The blocks are placed on the table with pictures down. Divide them equally among the players. Each player keep the blocks out of sight of his opponent. The player who holds a 6 by 6 block [6] places his block first. Then the next player lays a block with a number six or a picture of 6 objects. Match the number with a picture or a picture with a number symbol. The first player to lay all his blocks on the table is the winner.



The game is suited to all levels (Level I to VI). It can be given to a group of pupils who finish their classroom work ahead of the others.

6. POSSIBLE MODIFICATIONS

Clipboard or tagboard can substitute for the bamboo dominoes. Add more cards to a set by having sets of 1 – 9. That will make 81 cards altogether to allow more participants to the activity.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 47

ROULETTE

1. BRIEF DESCRIPTION

This visual aid is made of a double rounded tagboard fastened together at the middle which can be turned in opposite directions. Pictures in the inner circle can be seen one at a time through a window slit made in the outer circle.

2. OBJECTIVES

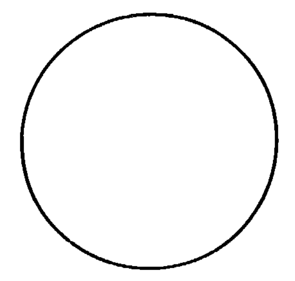
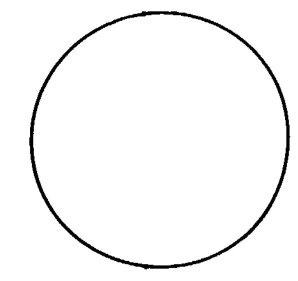
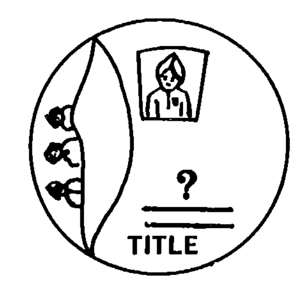
1. To identify the nationality of the people through pictures.
2. To describe the similarities and differences of the people of the world.
3. To discuss the reasons why some people have close similarities.

3. MATERIALS USED

Tagboard, a pair of scissors, fastener, cut-out pictures of different nationalities and paste.

4. HOW TO MAKE

Cut two circles of the same size, 1½ feet in diameter out of tagboard. Paste cut-out pictures of people of different nationalities (2" x 2") and paste each picture at the upper corner of the inner circle one inch far from each other. This can accommodate 12 pictures. Cut a window slit on the outer circle just enough to show one picture at a time when turned clockwise or counterclockwise. A little pocket holder can be pasted at the back of the outer circle to cover the printed name below each picture. Fasten the two circles together at the middle.

5. HOW TO USE

This device is turned clockwise slowly to allow the pupils to identify the nationality of each picture. To make the presentation systematic, the outer circle should be held firmly with the window placed steadily on top. Turn the inner circle slowly.

Pupil's answers could be checked by removing the piece of cardboard at the bottom of the window slit.

6. POSSIBLE MODIFICATIONS

Other related pictures to develop a unit can substitute the ones on this device. Scraps of plywood may be used instead of tagboard.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 48

SPELL-O

1. BRIEF DESCRIPTION

"Spell-O" is an exciting brain tickler for third, fourth, fifth, and sixth graders. It is ideal for exceptional children. *It is an excellent mental exercise for pupils with wide vocabulary.*

2. OBJECTIVES

1. To reinforce spelling and vocabulary building skills.
2. To make learning activities enjoyable and meaningful.

3. MATERIALS USED

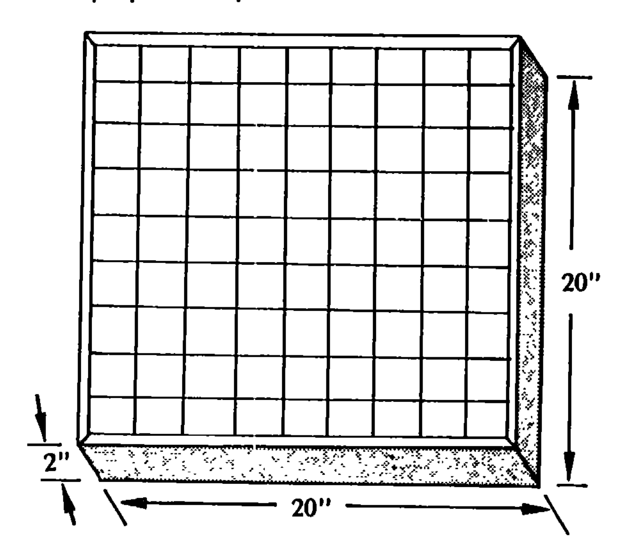
Plywood – Pre-cut to size 20" x 22",
Buri (palm) mat – Pre-cut to size 20" x 22",
4 Chinese bamboo pieces – Pre-cut to sizes 20" (2 pieces) and 22" (2 pieces),
A ball of brightly colored "stambre" thread,
Bamboo chips – 10" long (for chip rack), 4 pieces of wood for support,
Cartolina for paint chart,
Recycled can or box to hold 104 chips,
Water color or pentel pens of assorted colours,
Indian ink and pen/brush,
A pair of scissors, glue and cartolina (thin cardboard) strips (104 pcs.) – size 2" x 1½".

4. HOW TO MAKE

1. Draw objects representing the twenty-six letters of the alphabet on cartolina chips. Make four sets of different drawings for each letter. Colour the drawings and cut out and paste on each bamboo chip.
2. Lay buri mat over plywood.
3. Divide the area into different squares by using stambre (thick woolen) thread.
4. Secure the four sides by nailing Chinese bamboo pieces on the borders to permanently hold the buri mat and plywood together.
5. Device a point chart by assigning point/s to each letters:

A	– 1	N	– 1
B	– 3	O	– 1
C	– 3	P	– 3
D	– 4	Q	– 10
E	– 1	R	– 1
F	– 1	S	– 1
G	– 1	T	–
H	– 1	U	–
I	– 1	V	–
J	– 10	W	–
K	– 5	X	–
L	– 1	Y	–
M	– 1	Z	–

"Joker" – May represent any letter.



5. HOW TO USE

1. "Spell-O" may be played by four players.
2. Deposit all bamboo chips inside a container big enough to hold 104 chips.
3. Each player randomly picks a chip. Sequence of players is determined by alphabetical arrangement of letters picked out.
4. Each player picks out 5 more chips. He arranges these chips on his rack, trying to form a word by using the initial letter of each object only.
5. The first player lays his word on the "SPELL-O" board making sure one of the chips covers the RED area.
6. The next player forms a word in inference to the letters formed by the previous player.
7. The player who can't form a word out of his chips may say, "PASS" and gives way to the next player.
8. As soon as one player exhausts all his chips, the game is won in his favour.

SCORING

1. Every player is entitled to points. The frame of reference is the accompanying Point Chart.
2. Points are summed up only after the player has finished forming his word on the board. Consider the "SPELL-O" "double-word," and "triple word" cues when scoring.
3. One object may have different names depending on the vocabulary control of the player. Hence, a "queen" may either be called "monarch" or "royalty," depending on its usability to the player.
4. When a word is questioned, the dictionary or teacher may be consulted.

Notes:

1. For exceptional children
   a) A reinforcement tool for recognizing objects and spelling.
   b) The more mentally gifted the child is, the firmer is his grasp of new words.
   c) An excellent mental exercise for wide readers.

2. For average pupils

    a) A drill for object recognition and spelling out simple words.

    b) May be used for practice in adding whole numbers in mathematics.

    c) In art, objects may be used as models for learners to copy.

6. POSSIBLE MODIFICATIONS

Other materials may be used. Recycled cardboard for buri mat; strips of colored paper for the thread; empty matchboxes as backing for bamboo chips. The resourceful teacher is free to modify the mechanics of the game to suit his/her particular objectives.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 49

SPIN AND ADD

1. BRIEF DESCRIPTION

This game is a modified version of spinning the top. The top here is made of polygon of ten sides, numbered one to ten at random. This is a game for addition or multiplication skills.

2. OBJECTIVE

To answer addition/multiplication combination correctly and with considerable speed.

3. MATERIALS USED

Discarded paper plates, glue, tagboard, and pentel pen.

4. HOW TO MAKE

1. Make a number top. (Cut a polygon of ten sides. Paste it on a tagboard. Number the sides one to ten at random).
2. Make another wheel out of a paper plate. Divide the circumference into ten spaces. Number the spaces one to ten at random.
3. Punch a hole on the number top and put a stick through it.
4. Take another circular tagboard 1" in diameter and punch a hole at the centre. Paste it at the centre of the paper plate.

   (See illustration below)

5. HOW TO USE

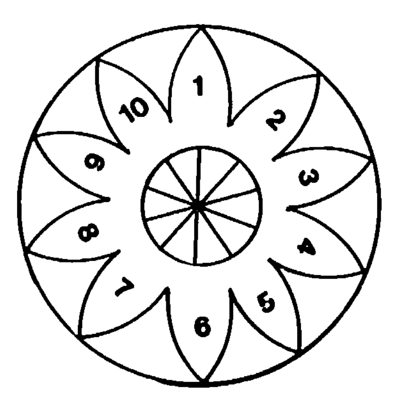
Let the child spin the top, then wait until the top is at rest. Look at which side the top rests. Add the two adjacent numbers. If the answer is right the child earns a point for his team.

The game may be used individually or by teams. It is intended for the mastery of the basic addition/multiplication facts.

6. POSSIBLE MODIFICATIONS

This game may be used in the upper level by using two-digit numbers instead of one-digit. It is also used for drill in multiplication.

Subtraction skill can be reinforced with this device by taking the difference of two adjacent numbers on the wheel.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 50

TACHISTOSCOPE

1. BRIEF DESCRIPTION

This device is handy for quick recognition of words, because of the rapidity of presentation that can be made. This is useful for word drills such as days of the week, months of the year, etc.

2. OBJECTIVE

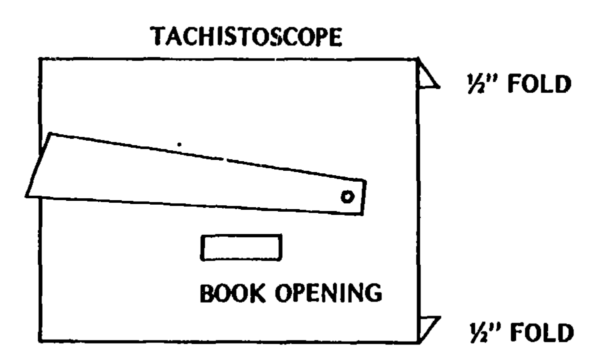
To recognize words at a considerable speed.

3. MATERIALS USED

A 20 cm. x 30 cm. cardboard, cigarette boxes or any thick paper for word cards and nailhead fastener.

4. HOW TO MAKE

1. Cut a piece of cardboard to a convenient size (20 cm x 25 cm) or any other size.
2. Fold back about 2 cm along each of the long sides. This serves as a tray to hold the printed materials.
3. Cut an opening in the center, wide enough to allow the printed word to be seen and fasten another piece of cardboard to it to serve as a shutter.
4. Print words on separate cards.



5. HOW TO USE

The word cards are slipped into the fold. When operating, the cards are placed behind the opening but are hidden by the shutter. Hold the cards with the left hand, the thumb holding the card against the screen. Lift the shutter with the right hand to show the word and then let it drop. The word is shown for about a second. If the word is missed, the shutter is lifted again to allow the child to look at the word carefully and read again. Cards to be flashed on the screen may be changed from time to time when necessity demands.

6. POSSIBLE MODIFICATION

The shop teacher may be asked to make the device out of wood scraps. A pocket chart may be prepared as handy receptacle for the words.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 51

TARGET MASTER

1. BRIEF DESCRIPTION

The target master is a device which capitalizes on the children's competitive spirit. Used as a game, it does not only create greater interest in the learning activity, but also develops desired skills as well.

2. OBJECTIVE

To develop skill in mathematical computation.

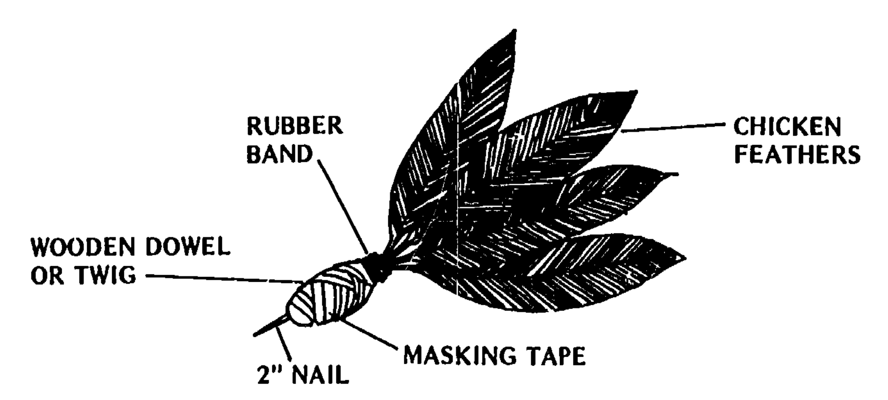
3. MATERIALS USED

Chicken feathers (stiff, tail and wing feathers), 4 cm. dowel with a diameter of about 1 cm., two-inch ordinary nails, rubber band, masking tape, box (at least 12" x 12") and water colors.

4. HOW TO MAKE

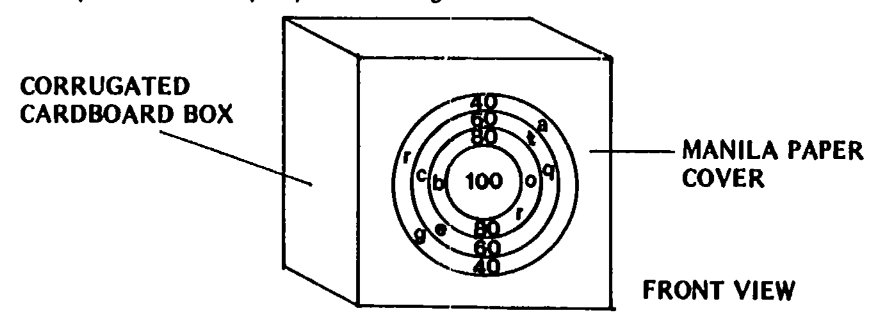
A. Dart

1. Remove the head of the nail.
2. Drive the head-end of the nail 2 cm. deep into the dowel.
3. Arrange six to seven feathers around the dowel and tie with a rubber band.
4. Cover the rubber band with masking tape.



B. Target board

1. Cover the desired side of the box with manila paper.
2. Prepare the bull's eye by constructing four concentric circles as shown below.



3. With water color, paint the rings with the desired color.

5. HOW TO USE

A. 1. To develop addition skills, numbers are written on the rings.

2. Let a pupil throw the dart.

3. Numbers hit are noted and then added.

4. The pupil or group of pupils with the highest total points is the winner.

B. Using the same procedure, the device may also be used for vocabulary development by writing letters in the rings instead of numbers. Letters that are hit are the initial letters of words to be formed.

6. POSSIBLE MODIFICATIONS

If magnetic strips are available, the nail in the dart may be dispensed with. A plain galvanised iron sheet painted accordingly will serve as a target board instead.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 52

THE "WHATSIT" BOX

1. BRIEF DESCRIPTION

The "Whatsit" Box is a simple cube-like structure with the names of countries written on the four sides. This educational box is intended for use in Grades five and six. It may be used by a small group or by the whole class.

2. OBJECTIVES

1. To identify the countries of the world.
2. To locate countries and other important places on the map.

3. MATERIALS USED

Empty box or styrofoam, glue, pentel pens, container, cartolina, and world map.

4. HOW TO MAKE

Make a cube-like structure from any discarded materials, preferably styrofoam. The box should be big enough to accommodate words readable from any point in the classroom. The structure must be so made that it is not too light nor heavy to hinder throwing from one pupil to another.

Names of countries written on a rolled strip of cartolina is inserted in the box with wide windows on two sides. Provisions should be made that unrolling of the strip would be easy for showing the right answer to the class.

5. HOW TO USE

The class may be divided into two groups. The teacher points to a certain country on the map and asks, "WHATSIT?" as she throws the box to any group member who catches it and shows to the class the side on which the correct name of the country pointed to is written. If the answer is right, a point is earned by the group whose member answers the question correctly.

The game continues as each member of the group throws the box alternately from one group to the other asking "Whatsit?" refering to what place the teacher is pointing to on the map.

6. POSSIBLE MODIFICATIONS

This game may be used in Communication Arts – English, Mathematics, Science or any activity in the classroom. Other light weight materials may be used for the box. Varied questions may be asked by the teacher or the pupils.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 53

WHEEL OF CHANCE

1. BRIEF DESCRIPTION

A clock-face figure with words alongside which can be a very effective device for vocabulary development.

2. OBJECTIVE

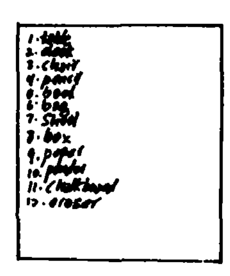
To read names of objects found in the classroom (Lesson 2-A, Unit II, Look and Learn).

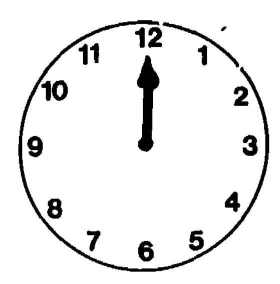
3. MATERIALS USED

A piece of cartolina about 30 cm x 23 cm and a black cardboard strip.

4. HOW TO MAKE

1. Draw a large circle on a cartolina or cardboard to represent the face of the clock.
2. Number it accordingly from one to twelve as in a clock face.
3. From a black cardboard strip make the hands at the centre with a nail-head-fastener seeing to it that they can rotate.
4. Print the words either on the chalkboard or another large sheet of paper and place the clock-face beside it.





5. HOW TO USE

The teacher shows the pupils how to make the hand turn after which a child is called on; he flicks the hand with his fingers, sees the number at which it stops, then reads the corresponding printed word.

6. POSSIBLE MODIFICATIONS

Numbers from old calendars may be used. Words or even phrases may be taken from any lesson which calls for vocabulary development or enrichment, not only in English but also in other subject areas.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 54

WINDOW-WHEEL

1. BRIEF DESCRIPTION

This is a device for drill exercises on basic fundamental operations. It consists of two concentric wheels which can be manipulated to match the number combinations to be solved. The numbers are displayed through the window of the bigger circle and on the center of the smaller circle which is covered with flannelette.

2. OBJECTIVE

To answer basic fundamental facts with speed and accuracy.

3. MATERIALS USED

Cover of discarded plastic pail (big size), glue, sandpaper, cartolina, pentel pen, flannelette and crayons.

4. HOW TO MAKE

1. Cut cartolina into a circle to be marked circle A. See that it fits well into the inside pail cover.
2. Cut another circle to be known as circle B. See that this fits well into the outer center of the pail cover. See Figures 1 and 3.
3. Divide circle A into ten equal parts and number each part from 0 to 9.
4. Cut nine more circles as big as circle B. Paste sandpaper at the back of each circle. Number each circle from 0 to 9, making a total of 9 numbered circles.
5. Cut off a rectangular window from the pail cover through which the numbers of Circle A could be seen. (See Figure 3).
6. Cover with flannelette, the outer center of the pail cover.
7. Fit circle A into the inside pail cover.
8. Stick a numbered circle B to the adhesive circle at the center of the pail cover.

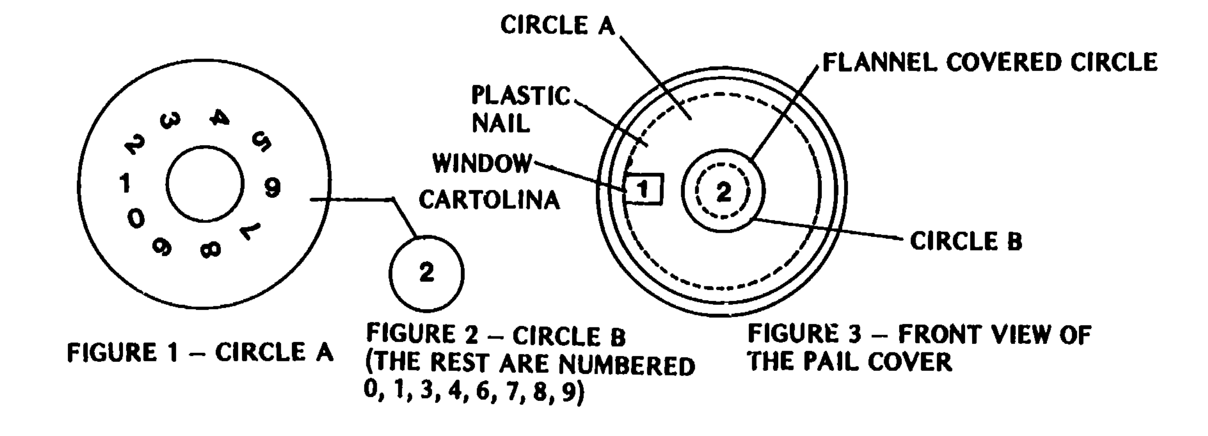


FIGURE 1 – CIRCLE A

FIGURE 2 – CIRCLE B (THE REST ARE NUMBERED 0, 1, 3, 4, 6, 7, 8, 9)

FIGURE 3 – FRONT VIEW OF THE PAIL COVER

5. HOW TO USE

Turn Circle A manually. The pupils add the number appearing in the window to the number appearing on Circle B stuck to the flannelette circle. The drill may be done in a contest where two pupils participate. The first one to add the combination gets a point. The player with the most points wins. When done by groups, each group member takes turn in the window drill. The group that adds the most combinations wins.

6. POSSIBLE MODIFICATIONS

1. Pupils may subtract, multiply or divide the numbers appearing in the window by the number in Circle B.
2. Number sentences like (3 + 2) or (7 x 1) can be drawn on cards to be stuck to the adhesive center for more complicated operations.
3. For phonics drill, letters could be used instead of numbers to form words or syllables.
4. An imaginative teacher may use this material for other subject areas where pairing or combination facts or symbols are tó be developed.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 55

WORD DOMINO

1. BRIEF DESCRIPTION

Instead of dots, words or phrases are printed on cards to serve as domino blocks. This device is effective to word recognition or the development of perception skills.

2. OBJECTIVES

1. To perceive similarities in shape or color of objects.
2. To read words or phrases at a glance.

3. MATERIALS USED

Discarded cigarette boxes, ruler, pentel pen, a pair of scissors and water color or crayons.

4. HOW TO MAKE

1. Cut empty cigarette boxes into 5 cm x 8.5 cm rectangular cards.
2. Draw a line a little bit off-center on each card. On the bigger space, write the names of colors while on the smaller space, draw geometric figures.
3. See to it that each color is written several times, (preferably five times) and each figure is drawn the same number of times.
4. Color the figure accordingly.

GREEN	O	GREEN	△	GREEN	○	GREEN	□	GREEN	▭
BLUE	O	BLUE	△	BLUE	○	BLUE	□	BLUE	▭
YELLOW	O	YELLOW	△	YELLOW	○	YELLOW	□	YELLOW	▭
RED	O	RED	△	RED	○	RED	□	RED	▭
ORANGE	O	ORANGE	△	ORANGE	○	ORANGE	□	ORANGE	▭

5. HOW TO USE

1. Divide the class into two or three teams and distribute the cards equally. Toss a coin to determine which group will begin.
2. Group A puts one card on the table while groups B and C make connections, either through identity of word colour or shape.
3. The first group to use up all cards is declared the winner.

6. POSSIBLE MODIFICATIONS

1. Phrases may be used instead of words for Grade 2.
2. For Reading Readiness, only objects are drawn instead of words printed.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 56

WORD MOBILE

1. BRIEF DESCRIPTION

This is an instructional material that can be used in teaching antonyms and other words in pairs. It is made of mobile parts in a frame.

2. OBJECTIVE

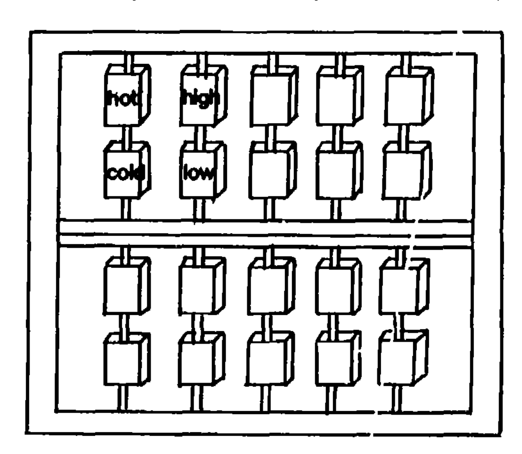
To develop skill in identifying antonyms.

3. MATERIALS USED

Three pieces of used soft drink straws, 6 pieces of bamboo sticks, 14" long and twenty empty match boxes.

4. HOW TO MAKE

1. Wrap with different colored paper the 20 empty match-boxes.
2. Cut the straw into pieces which are ¾" long.
3. Using a needle and thread, string the materials in the following order: ¾" long straw, match box, ¾" long straw.
4. Make two frames 7" x 14" out of the six bamboo sticks.
5. Tie the ends of the stringed straw and match-boxes to the bamboo stick frame, five pairs or ten match-boxes in each frame.
6. Then tie together the two frames with ten match-boxes each.
7. Put a string or handle to the mobile.
8. On the faces of the match-boxes, write the antonyms, i.e. hot-cold, long-short, etc.



5. HOW TO USE

Use this mobile in teaching antonyms. Let the pupils turn the match boxes to get the antonyms in line.

6. POSSIBLE MODIFICATIONS

1. This mobile can be used for other exercises like synonyms, agreement between subject and predicate, in number and in tenses of verbs.
2. Other throw-away materials which can be written on and turned around may be used.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 57

WORD WEAVING

1. BRIEF DESCRIPTION

This device is made of old calendar woven with colored cartolina. Words are printed alternately on the cartolina for the pupils to read and tell to what group of cultural heritage each word belongs. This device is suited for the evaluation phase of the lesson on the "Pamana ng Lahi," "Materyal at Di-Materyal."

2. OBJECTIVE

To read and identify the type of cultural heritage to which the word belongs (material or non-material).

3. MATERIALS USED

Old calendar, pentel pen, colored cartolina and a pair of scissors.

4. HOW TO MAKE

Cut as many strips (1½" wide) on the second sheet of an old calendar. Do not separate the strips at the top so that when this device is hanged the strips will fall normally in its place. Cut other strips of colored cartolina (the same widths) now separately from one another. Insert these strips in a woven form. Print words of material and non-material cultural heritage and paste them alternately on the colored cartolina. Be sure that these words are covered when pulled sidewise on the right and are shown when pulled on the left.

Hang the said device when used. On the first sheet of the calendar, instruction for the pupils may be printed.

WIKA		NGALAN		
	GAMIT		FAGKAIN	
SASAK		AYAW		
SA	BAHAY KUEO		SOOTAN	
DASAL		SIMBA		

5. HOW TO USE

After the presentation of the lesson on the type of cultural heritage, present this device for evaluation purposes.

Set the words on the woven sheet so that they are all covered. Let a pupil pull sidewise right one strip at a time (when strips are pulled the words are shown). Let the pupil read the words printed on this strip and identify the type of cultural heritage the word belongs to.

6. POSSIBLE MODIFICATION

Substitute the words with the ones connected with the lesson presented.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 58

BAC-A-PACK

1. BRIEF DESCRIPTION

A pocket chart of abaca, naturally light, portable, and long lasting with as many pockets as desired.

2. OBJECTIVES

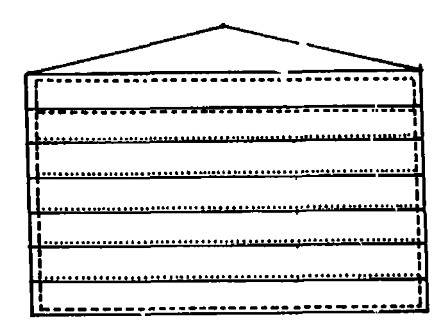
1. To hold instructional materials like flashcards and cut-out pictures.
2. To facilitate learning not only in English but in the other subject areas as well.

3. MATERIALS USED

Abaca stalks, abaca twine and a big needle.

4. HOW TO MAKE

1. Trim dry abaca stalks into equal width and length.
2. Sew the pockets with tiny strips of abaca.
3. Make a string holder by braiding the tiny strips and attach this holder to both ends of the pocket chart.
4. Insert a bamboo stick at the top to make the upper portion firm.



5. HOW TO USE

1. Develop a lesson by gradually inserting the flashcards or cut-out figures in the pocket chart.
2. Let the pupils read the words on the flashcards or retell the story from the cut-out figures.

6. POSSIBLE MODIFICATIONS

1. Nipa, buri or coconut leaves may be used instead of abaca.
2. To secure the edges, nito, rattan or long strips of cloth may be used in place of abaca twine.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 59

BAMBOO SCROLL ROLLER

1. BRIEF DESCRIPTION

This collapsible bamboo scroll roller is a handy teaching aid that can be carried around with ease. It has great utility value as it can be used in all grades for all subjects. All parts are made of bamboo.

2. OBJECTIVES

1. To make an oral presentation interesting and easily understood with the use of a scroll.
2. To narrate stories or give reports with animated illustrations with the use of a convenient roller.

3. MATERIALS USED

Bamboo pieces, saw, wood glue, chisel, lacquer varnish, knife, sandpaper and hand drill.

(Suggestion: Use only sharp tools to obtain the best result)

4. HOW TO MAKE

1. Cut the following pieces of straight seasoned bamboo:
   a. One piece, 16" long and 3" in diameter for the base.
   b. Two pieces, each 16" long and 1" wide to be used as braces for the base.
   c. Two pieces, each 16" long and 1½" in diameter for posts.
   d. Two pieces, each 16" long and ½" square, to be used as rollers of the scroll.
   e. One piece, 16" long and 1" wide of thick bamboo, for the handles of the rollers.
   f. One piece, the size of one of the bases for the upper brace.
2. With a sharp knife, scrape off the rind or skin of the bamboo pieces.
3. Cut tenons on both ends of the pieces to be used as posts.
4. Split into halves the piece to be used for the base.
5. Cut mortises on the middle of each of the pieces to be used as the base, to fit the lower tenons of the posts.
6. Cut mortises on the piece to be used as the upper brace to fit the upper tenons of the posts.
7. Bore two 3/8" holes on the inner side of the post to be used as left post, each hole about 3" from each end of the post.
8. Cut a groove on the lower part of the right post in level with the hole on the left post for the lower roller to enter and turn.
9. Cut tenons on both ends of the pieces to be used as braces of the base.
10. Cut mortises on the lower portion of the bases about 1" from each end to fit the tenons of the braces tightly and firmly.
11. Shape the two pieces of the rollers into rounded rods.
12. From the thick piece of bamboo, cut and shape the handles for the rollers and set them in place with wood glue. Do not apply glue to the mortise and tenon joints to have a collapsible model.
13. Smoothen all parts with sandpaper and apply clear gloss lacquer to preserve the natural beauty and color of the bamboo.

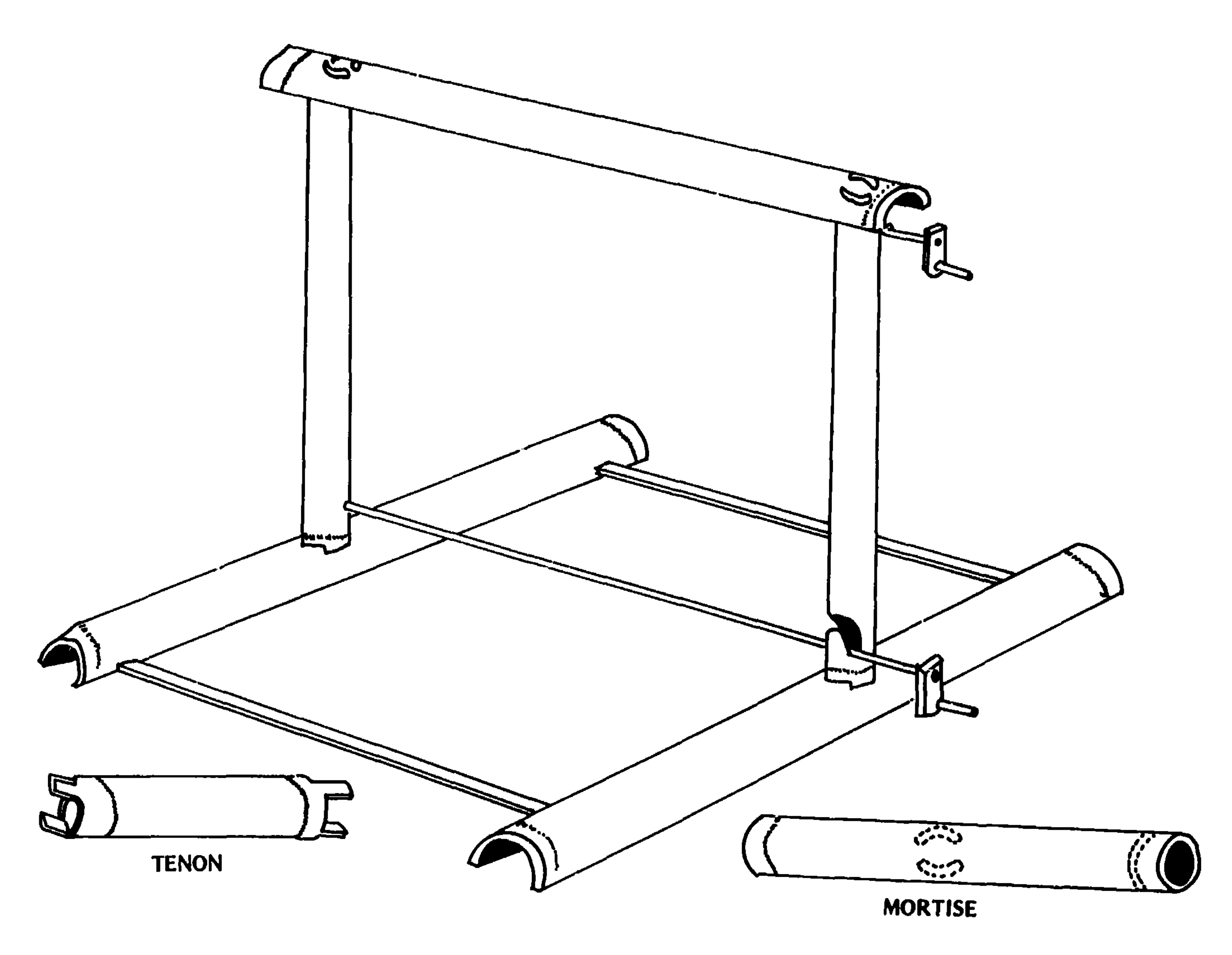
    The illustrations below show how the parts are attached together to form the scroll roller.

5. HOW TO USE

Roll the prepared scroll around the lower roller. Attach the free end to the upper roller. Wind the upper roller by turning the handle to show the illustrations or drawings as desired. The scroll showing the sequence of illustrations or ideas, may be made of paper, cloth or any available material which can be rolled. Files of scrolls made by the children will make the use of the scroll roller more meaningful to the class.

6. POSSIBLE MODIFICATIONS

Pieces of wood or thick and hard cardboard can be used in the absence of bamboo pieces.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 60

A CART OF KNOWLEDGE

1. BRIEF DESCRIPTION

A miniature cart about 45 cm long, 30 cm wide and 25 cm deep with a carabao cut-out pulling it is loaded with instructional materials for the following subject areas:

Mathematics — Number cards, addition and subtraction flashcards

Reading in English – Spelling patterns for beginning reading alphabet blocks

Art — Balls of different colors

Social Studies/Science — Illustrations of different land forms

Pilipino — Flashcards of different syllables, words, phrases.

2. OBJECTIVES

1. To help the learners acquire skills in the different subject areas such as Mathematics, English, Arts, Social Studies, Science and Pilipino.
2. To provide varied experiences in the acquisition of facts and information.
3. To facilitate learning with the help of different inexpensive instructional materials in the different subject areas.
4. To make learning interesting, meaningful and relevant to the development of the child as a good citizen in the community.

3. MATERIALS USED

Popsicle sticks, bamboo strips, cardboards, crayons, old calendars, thumbtacks, discarded soap boxes, styrofoam, cartolina, pentel pens, art paper, a pair of scissors, ball of varied sizes and colors, fasteners, water color and can covers.

4. HOW TO MAKE

1. Construct a cart out of a small box, popsicle sticks and colored paper, and four can covers for the wheels.
2. Cut out a carabao from a milk box (thick cardboard). Color it black.
3. Make a platform out of a thick cardboard. Cover it with a cartolina. Let it stand on studs made of styrofoam gestetner ink-boxes.
4. Draw or cut out a picture of a child holding up a strip of paper with the label "Halina't Mag-aral."
5. Prepare the contents of the cart:

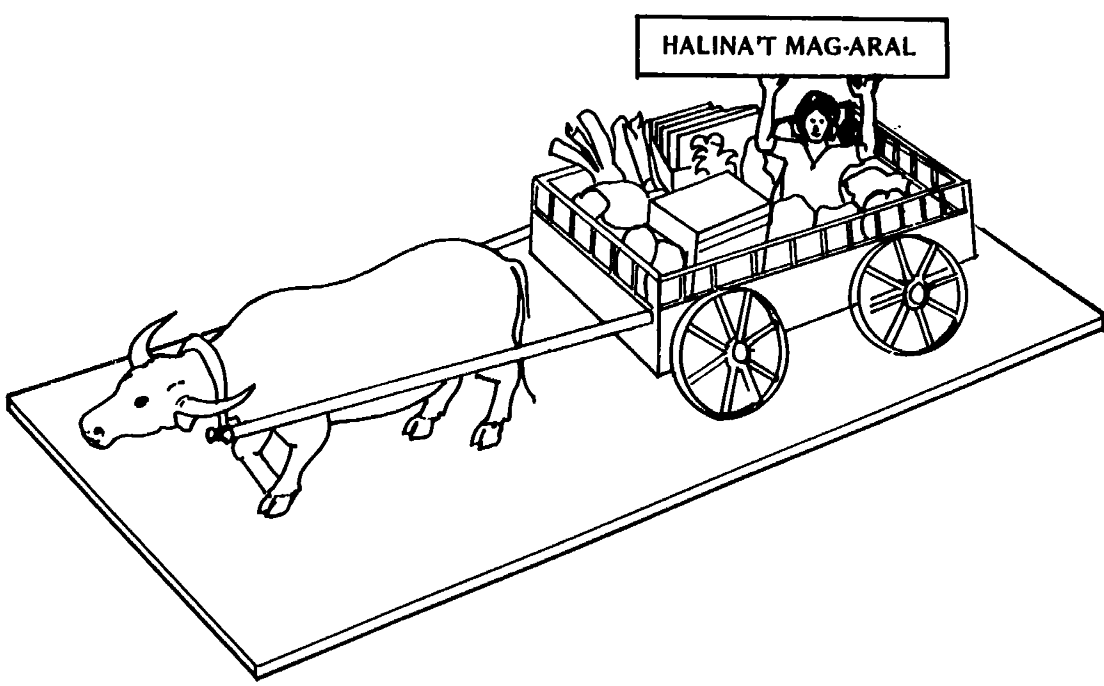
   Mathematics -- Cut flashboards out of cartolina. With a pentel pen, write addition and subtraction facts. These cards can be used for drill purposes. Make discarded soap boxes blocks. Use the reverse side. Paste numbers cut out from old calendars on all sides of the blocks.

   Reading in English – Collect some cardboards. Cut them into pieces (5 x 7 inches). Fasten the cards using a piece of string by sets. Each set contains words belonging to one spelling pattern. These can be used when children work in small groups for peer tutoring. One child flips the cards while the others read them aloud.

   Art – Place in the cart, plastic balls of different colors and sizes for the pupils to identify the colors and compare sizes.

   Social Studies/Science – Illustrate land forms such as waterfalls, volcanoes, lakes, rivers on cartolina pieces, 20 cm x 30 cm each. Bamboo strips with printed words to identify the illustrations go with these sets of land forms. Other cards for products and industries and different types of transportation are also placed in the cart.

   Pilipino – Prepare some flashcards out of cartolina and print some syllables, words and phrases. These cards can be used for drill exercises.



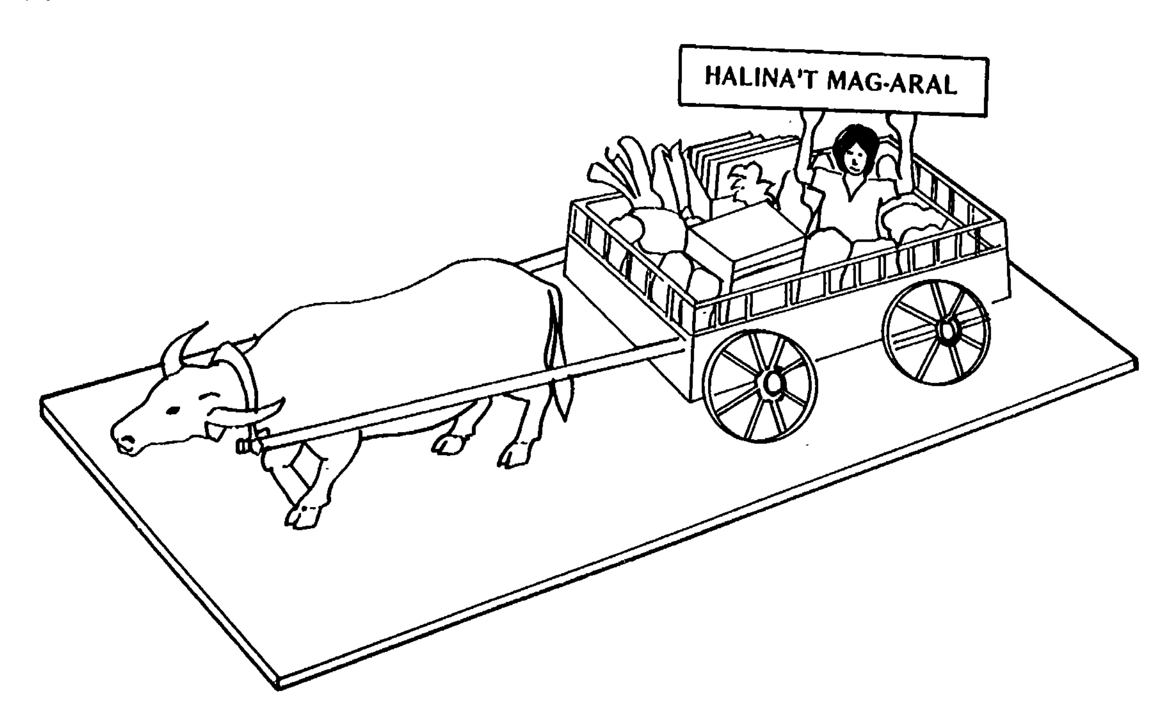
5. **HOW TO USE**

The instructional materials in the card can be used for development of concepts and for drill purposes in the different subject areas mentioned.

6. **POSSIBLE MODIFICATIONS**

Wooden figurine or cut-out of a cow or a horse may be used in place of the carabao. A wooden or tin calesa or sledge in place of the cart may be used.

Instructional materials to be loaded in the cart may be changed now and then to arouse greater interest among the children.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 61

EDUCATIONAL MATERIALS UTILITY TABLE

1. BRIEF DESCRIPTION

This is a handy utility table made of wood that can be moved from place to place on rollers. It has a table top which is supported by an iron-rod, and can be used as a flannelboard when opened. The drawers and partitions are convenient storage spaces of various educational materials which are often used in the classroom.

2. OBJECTIVES

1. To have a ready table for demonstration purposes in front of the class with all necessary materials within each reach of the teacher and pupils.
2. To provide a safe and convenient storage space for educational materials which are often needed in the classroom.

3. MATERIALS USED

4 pieces 2" x 2" x 32" for posts
8 pieces 2" x 1" x 32" for studs
8 pieces 2" x 1" x 24" for studs
2 pieces 2" x 1" x 28" for divider stud
1 piece 4" x 24" x ¾" for top cover (plywood)
2 pieces 28" x 24" x ½" for side panels
1 piece 28" x 40" x ½" for back panel
1 piece 12" x 40" x ½" for front panel
1 piece 24" x 12" x ½" for divider, upper section
3 pieces 40" x 24" x ½" for bottoms of boxes
1 piece 20" x 12" x ½" for divider, upper left section
1 piece ½" diameter x 24" long iron rod
4 pieces 2" diameter rubber roller

4. HOW TO MAKE

This table can be constructed by any competent industrial arts teacher by following the specifications in the illustration on the next page. The specifications and dimensions as well as the materials to use may vary to suit the convenience and desire of the teacher-user.

5. HOW TO USE

Position the table with its back toward the class. Open the top cover to a vertical position and secure it with the iron rod brace. This cover becomes a board for flannel or burlap or any desired material for demonstration purposes. All needed materials which are prepared beforehand are placed in the compartments for ready use during the class activities.

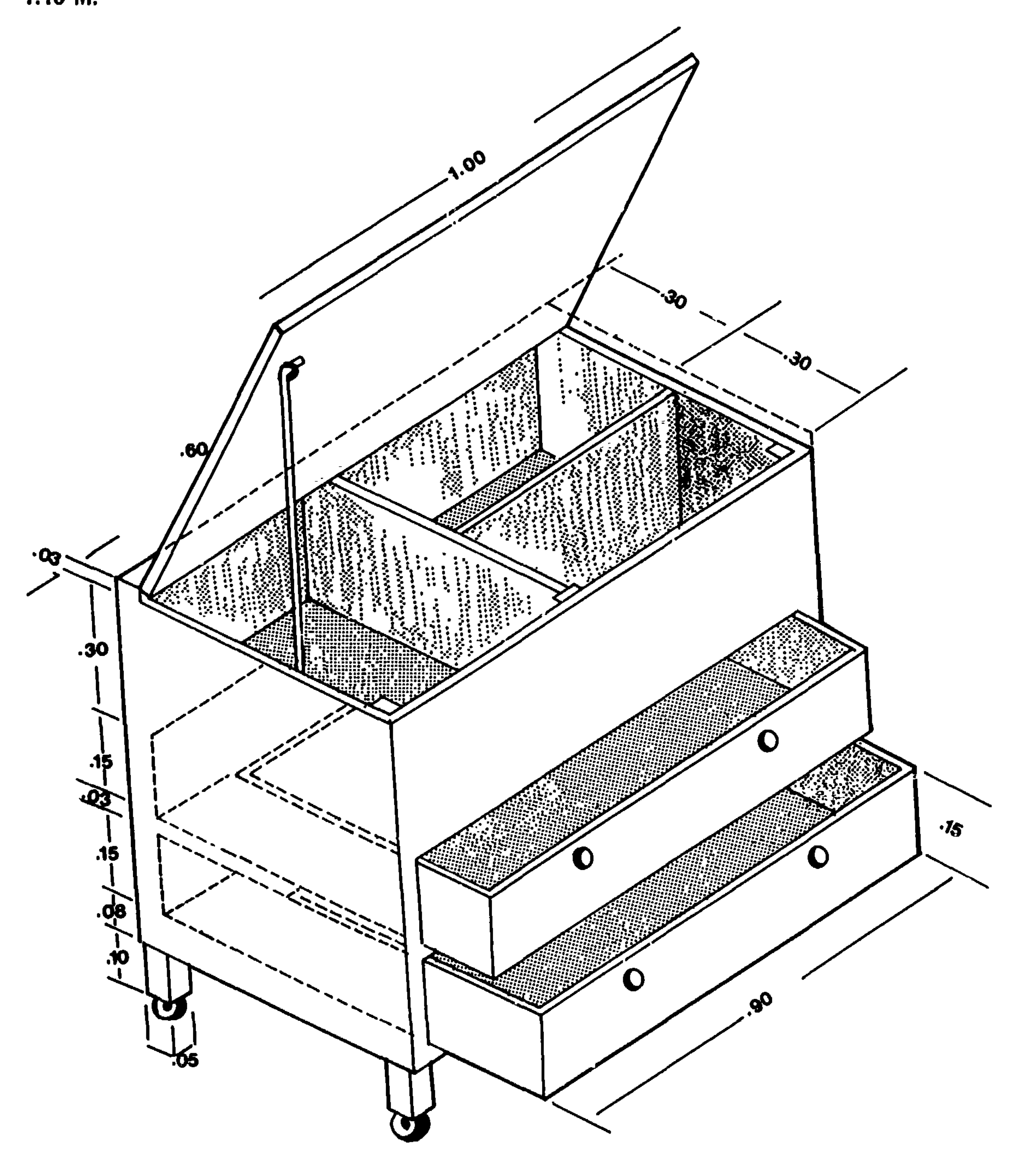
The left section of the upper box may be used as a container for printed materials, pamphlets, transparencies, pictures, etc. Even a slide carousel projector can be placed in this section. The upper right section which is divided into two parts may be used for smaller objects or accessories like pens, tacks, scissors, crayons, chalk, tapes, cut-outs, etc.

The lower two drawers may be used for bigger pieces of visual materials such as flannel-cloth, posters, charts, graphs, pictures, files, tear-sheets, etc.

6. POSSIBLE MODIFICATIONS

A heavy cartoon box or crate may be provided with a hard cover to serve the same purpose as this utility table. The partitions and shelves may be provided with smaller boxes which fit in the big box. Where there is abundance of bamboo, the table may be made of such material with similar specifications and design.

ISOMETRIC DRAWING
SCALE 1:10 M.



EDUCATIONAL MATERIALS UTILITY TABLE

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 62

FOLDING DIORAMA

1. BRIEF DESCRIPTION

This easy-to-keep device is made of a mass of abaca twine caught in a cellophaned carton for its base. Cut-out pictures are placed standing to simulate an event.

2. OBJECTIVES

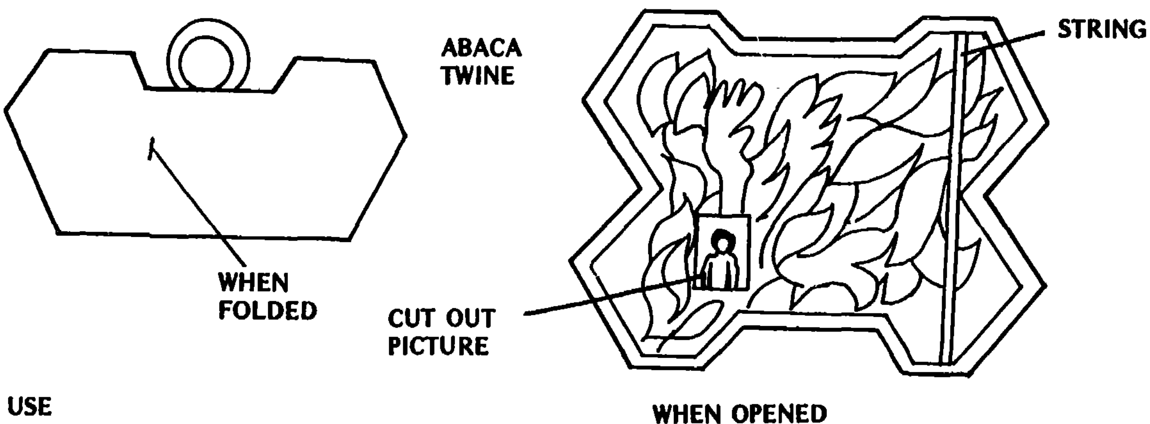
1. To present an activity or event in a three-dimensional material.
2. To tell a story with the use of a diorama.

3. MATERIALS USED

Cardboard, picture cut-outs, abaca twine, cellophane, old gift wrapper, paste, and a pair of scissors.

4. HOW TO MAKE

1. Shape the cardboard into a travelling bag with center fold.
2. Lay masses of abaca twine on both sides of the "bag" and cover this with cellophane by pasting appropriate trimming all around.
3. Cover the back side with gift wrapper.
4. Use cardboard strips as stands for the picture cut-outs depicting an event or activity. Paste one end of the cardboard strip to the picture and the other end to the base. Arrange the cut-outs in such a way that they are located from the forefront to the back. The picture representing the farthest view is pasted on one side of the base which is then made to stand by connecting it to the other base with a nylon string. The device can thus be opened and closed as needed.



5. HOW TO USE

1. Present a story through the diorama.
2. Ask questions about the story.
3. Let pupils tell the story.

6. POSSIBLE MODIFICATIONS

1. The diorama may be open or roofed.
2. A box may be used for the closed diorama.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 63

MATCH MIXER

1. BRIEF DESCRIPTION

This is a multi-purpose revolving open-ended box with a large pocket slot on one side and two smaller rectangular pockets slots on the other.

2. OBJECTIVES

1. To choose the right words in talking or writing about a picture.
2. To write correct sentences.
3. To spell words correctly.

3. MATERIALS USED

A thick cardboard (87½ cm x 32 cm) for the box, 2 pieces thick cardboard (15 cm x 32 cm) for braces, 1 piece cardboard (31½ cm x 30 cm) for large pocket slot, 1 piece cardboard (20½ cm x 34 cm) for smaller slots, manila paper (wrapping paper or colored paper of magazines), glue (masking tape), opened empty big alpine milk can, water colors (or paint) (optional) and wooden stand, 6 cm in diameter x 20 cm long.

4. HOW TO MAKE

1. Measure and mark the cardboard: (Figure 1)
   a) 5 cm from end A to B
   b) 30½ cm from B to C
   c) 16½ cm from C to D
   d) 30½ cm from D to E
   e) 5 cm from E to F

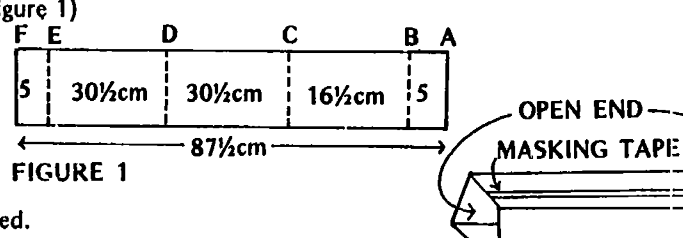


FIGURE 1

FIGURE 2

2. Fold cardboard along all points marked.
3. Tape ends A and E end to end with masking tape. This is the top side of the box. (Figure 2)
4. Glue braces one on each inside half of the bottom of the box so that they form X-shaped braces to support the box. (Figure 3)
5. Wrap the box with wrapping material.
6. Prepare the pocket slots and glue on each side of the box. (Figure 4)
7. Paint the box if wrapped with manila paper to make it attractive.

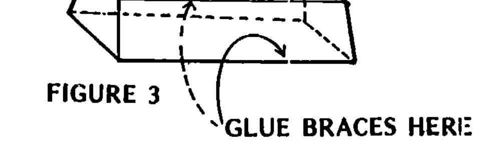


FIGURE 3

8. Trace the bottom of an opened empty milk can at the exact center of the bottom of the box. Cut eight radii from the center of the circle to the traced circumference. Fold each piece of the cut circle into the inside of the box. (Figure 5)

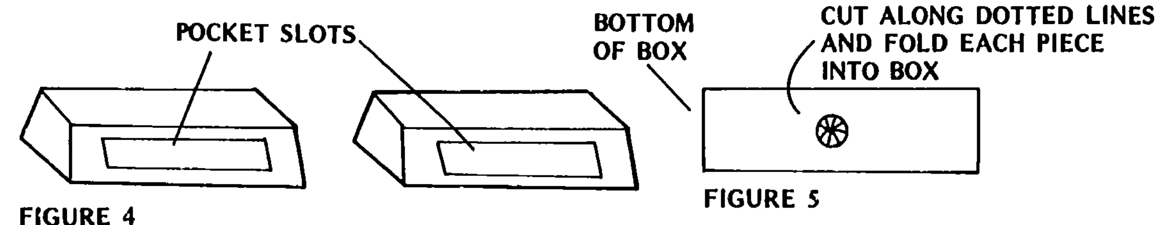


FIGURE 4

FIGURE 5

9. Prepare a stand 6 cm in diameter, 20 cm long, nailed into a heavy wooden base support.

10. Nail the can open end down to the stand, not too tightly so that the can rotates when turned. Insert the can into the hole at the bottom of the box so that the rim of the can is straight with the bottom of the box. Glue the strips of the board neatly to the can and let it stick very well. The box now revolves on its stand.

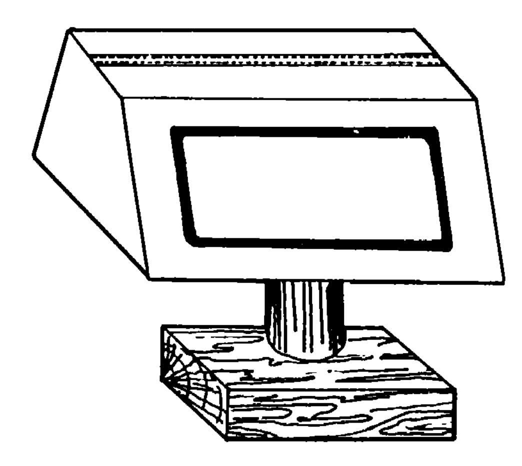
5. HOW TO USE

A. For vocabulary building: Place a picture in the large slot. To learn words about the picture, turn the box and show words placed in the smaller slots. When a series of pictures/words are to be shown, arrange them in the order that they will be shown and pull out each one to show the succeeding picture/word.

B. For spelling: Show the picture in the large slot. Example: (picture of mother). Show the word mother in the smaller slot with one letter missing. (Example: m o t _ e r). The children supply the missing h.

6. POSSIBLE MODIFICATION

The box could be used in almost all subjects for teaching new terms, identifying symbols, etc.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 64

MULTI-PURPOSE HOLDER OR STAND (BAMBOO)

1. BRIEF DESCRIPTION

This instructional device is made of bamboo, cut into halves and placed horizontally, which serve as a record or picture holder. Bamboo is used as basement and holder.

2. OBJECTIVE

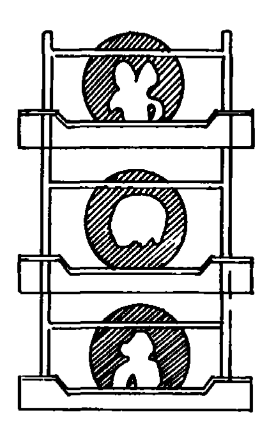
To provide a convenient stand for pictures mounted on a cardboard, old disc records, etc.

3. MATERIALS USED

Bamboo, varnish or shallac (optional), old broken records, glue, and a sharp knife.

4. HOW TO MAKE

1. Cut the bamboos according to desired dimensions.
2. Bore holes in the bamboos to get the desired numbers of shelves wherein to place the records or cardboards with mounted pictures or numbers. The diagram below shows the finished stand.



5. HOW TO USE

1. Insert the pictures or records which are related to the lesson or activity in the bamboo slots provided for in every shelf.
2. Teacher and pupils alike can readily manipulate this device in any subject areas desired.

This can be a very effective device for display to initiate units in varied subject areas; handy device for motivation and lesson proper development. It can further be utilized for evaluation purposes, wherein the teacher just places the key on display for the pupils to self-evaluate or self-rate themselves.

6. POSSIBLE MODIFICATIONS

1. Instead of old records, framed guinits, cartons and other hard scraps can be used for mounting the visual aid.
2. The dimensions can be altered to a desired size of the multi-purpose holder or stand.
3. In Mathematics, the holder can also be used as a counting device if objects or small balls are placed in each shelf.

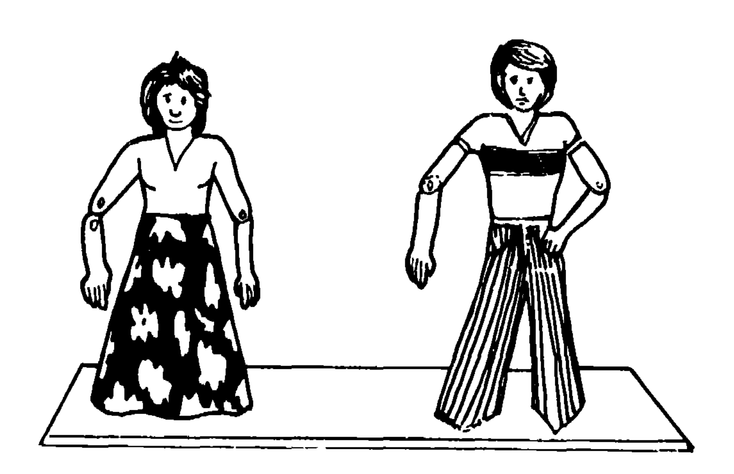
Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 65

NYLON STOCKING PUPPETS

1. BRIEF DESCRIPTION

The puppet heads of a boy and a girl are made of nylon stockings stuffed with rolled nylon stocking pieces. Black cotton yarns are attached to the back of each head for the hair. The eyes and noses are painted black and the lips, red. The puppet heads are held together with cardboard piece' The figurines are dressed with scraps or remnants of cloth.



2. OBJECTIVES

1. To utilize discarded nylon stockings for simple puppet heads.
2. To provide activities that require the use of puppets.
3. To improve expressions with the use of puppets.

3. MATERIALS USED

Discarded stockings, watercolor, remnants or scraps of cloth, cardboard, black yarn or strips of black cloth, pentel pen (black and red), needle and tread and old newspapers.

4. HOW TO MAKE

1. Cut some old newspapers into pieces and form a ball covered with more cut pieces of nylon stockings.
2. Wrap the ball with tissue paper to give it a smooth outer covering.
3. Put the ball inside a discarded nylon stocking.
4. Twist the stocking such that it forms an oval shape. Have this as the head. Leave some part of the stocking to wrap around the neck.
5. Cut a piece of cardboard about 1½" wide. Fasten the two ends by pasting to form a ring. See to it that the diameter of the ring should at least allow two or three fingers to enter for manipulation purposes.
6. Insert the end of the stocking into the ring and wrap this around the neck with needle and thread. The head is thus attached to the neck.
7. Cut pieces of black yarn for the hair. Attach the hair with simple catch stitches.
8. Prepare the arms using pieces of cardboards. Cover the arms with discarded stockings. Attach them to the clothings with simple catch stitches.
9. Prepare the outfit by using discarded remnants or scraps of cloth.

5. HOW TO USE

These puppets can be used for dramatic presentation and in retelling a story by the pupils. Songs, jingles and poems may be presented with these puppets.

6. POSSIBLE MODIFICATIONS

1. The arms may be made of bamboo pieces.
2. The head may be made of sawdust, paper mache or textile remnants.
3. The hair can be made of real hair or thread or straw.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in the Philippines" prepared by Miss S.P. Navarro, Chief, Physical Facilities Division, Bureau of Elementary Education, Department of Education and Culture, Philippines.*

SHEET 66

SPRING BALANCE (I)

1. OBJECTIVE

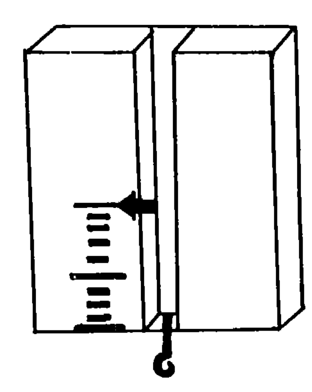
To construct a simple balance by using a piece of elastic thread and a flat piece of wood.

2. MATERIALS USED

A wooden board 15 cm x 10 cm x 2 cm, elastic thread 25 cm long, metal pointer and a nail 4 cm long.

3. HOW TO MAKE

1. Make a groove 1 cm wide and 1 cm deep along the middle of the board.
2. Fasten one end of the elastic thread at the middle top of the wooden board and let the other end hang freely in the groove. Fasten the pointer and form the nail to a hook.



3. Put different known convenient weights on the hook and mark one side of the board to obtain a scale.

Note: The balance can be used for convenient weighing with certain limited accuracy.

Source: *"A report of the National Workshop in Educational Technology: 21-26 October 1978" National Science Centre, Afghanistan.*

SHEET 67

SPRING BALANCE (II)

1. BRIEF DESCRIPTION

This is a simple and inexpensive instructional material made of bamboo strips, wire and mesh wire for developing simple science concepts. It looks like a bow and arrow.

2. OBJECTIVES

To demonstrate:

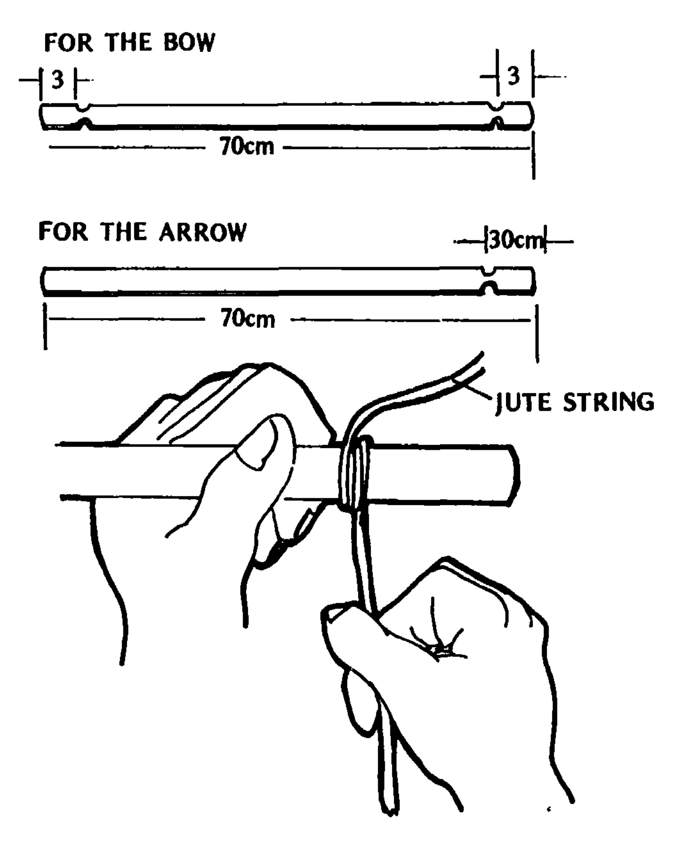
1. the concept of spring
2. the necessity of calibration
3. determination of unknown weight
4. idea of frictional force
5. relation of weight to force.

3. MATERIALS USED

Strips of bamboo 2.5 cm wide and 0.5 cm thick (or plastic material which can be elastic), lute string, or any other type of string, some wire, a basket made of wiregauze, cane, etc. and standard weights of 100g, 200g, 300g, etc.

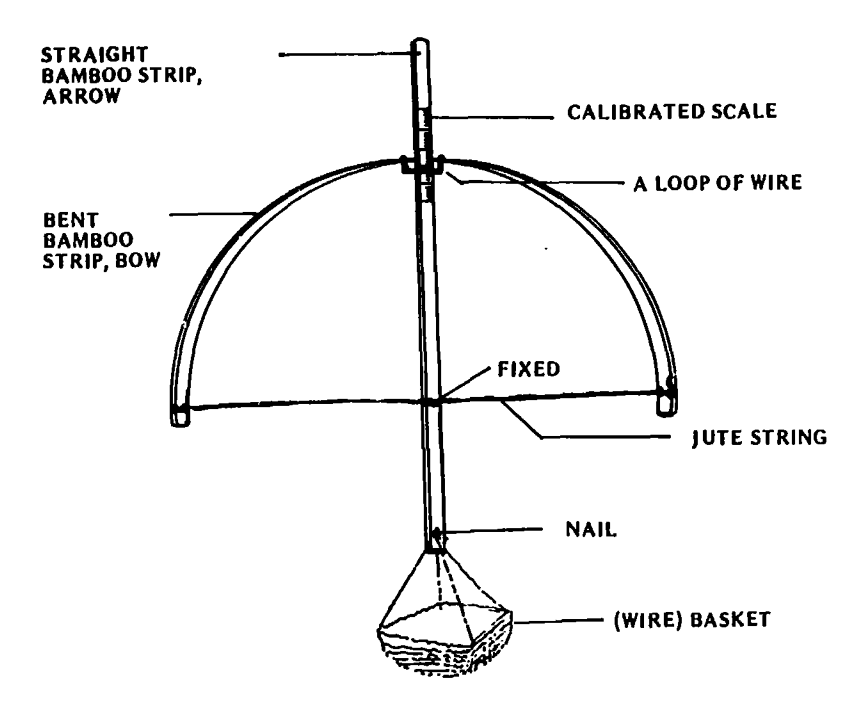
4. HOW TO MAKE

1. Take about two 70 cm length of bamboo strips. Use one for the bow and another for the arrow.
2. Tie the string to make the bow. It is better to slightly cut the strip about 3 cm from the two ends before tying the string to prevent it from slipping. The string should also be tied to the arrow about 10 cm from one end of the strip to hold it permanently at the centre.



3. In order that the arrow can move up and down, tie the wire around the bow so that it forms a loop.

4. Attach a basket with a nail at the bottom of the arrow.



5. HOW TO USE

1. The bow and arrow thus prepared acts as spring balance.
2. Make a mark for zero weight. Put known quantities of weight in steps of 100 gm or 50 gm. As the arrow is pulled downwards, mark a line on the arrow coinciding with the wire loop.
3. The scale thus calibrated for say 300 – 400 gm can now be subdivided into smaller units.
4. It is now ready to determine unknown weights in the range of calibration.
   (Caution: Exceeding and bending the bow beyond this range may not bring the zero position back).
5. Let the children try to bend the bow by applying their own force. If the bow is made of thicker material, it could be a game to find out the strength of each child. Thus force could also be measured through weights.
6. Lay down the spring balance on the ground. By tying the bottom of the arrow to a brick or a book/books and making them move on the same surface, can give an idea of the friction between two surfaces and their relationship with weight and surface area.

Source: *"An Instruction Sheet" developed by the participants of a Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kuala Lumpur, 5-15 December, 1977.*

SHEET 68

A-PAN-BALANCE FOR PRIMARY SCIENCE

1. BRIEF DESCRIPTION

A simple device made from easily available no-cost material that is useful in the primary level and even in the junior secondary level for activities related to weight and force.

2. OBJECTIVES

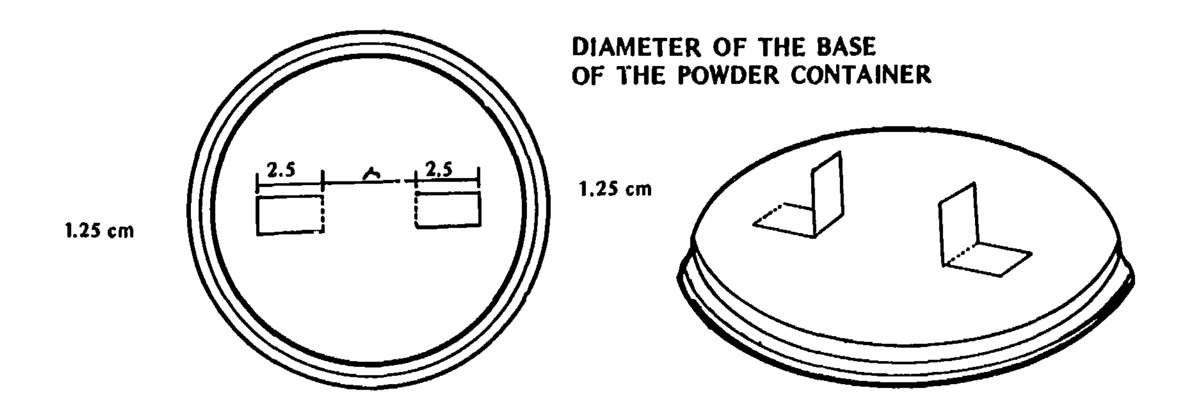
1. To indicate the weight of objects placed or forces applied on the pan.
2. To provide experiences for understanding the concept of weight and weight differences (light, heavy, equal-in-weight, etc.)

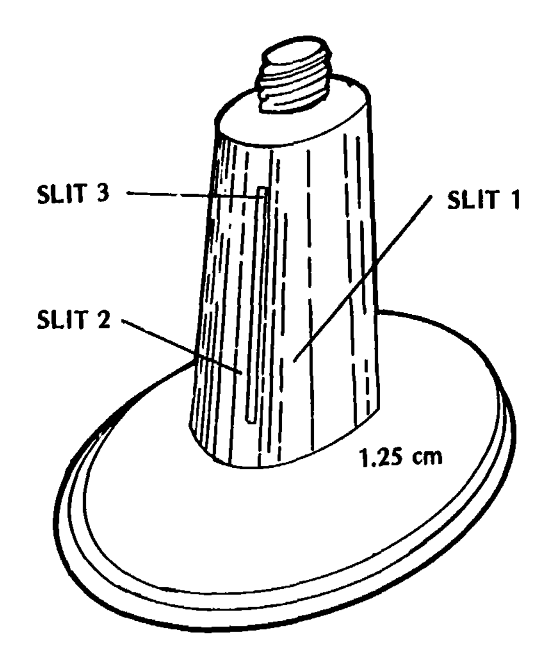
3. MATERIALS USED

Two tin lids, 10 cm in diameter, discarded plastic powder container, a cotton reel, pencil to pass through the cotton reel freely, a cycle valve-tube or elastic rubber band or cord, paper clip, sealing wax and string and rubber adhesive.

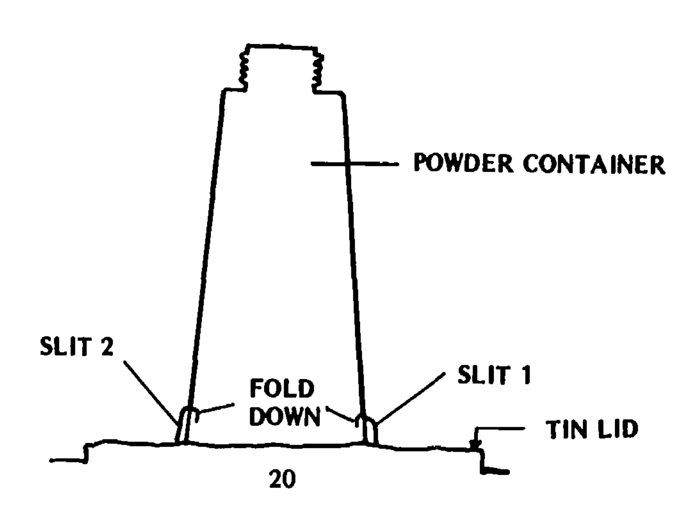
4. HOW TO MAKE

1. On one tin lid, mark the portion shown below in dotted lines, and cut with a cold chistle, bend the two flaps up at right angles to the lid.



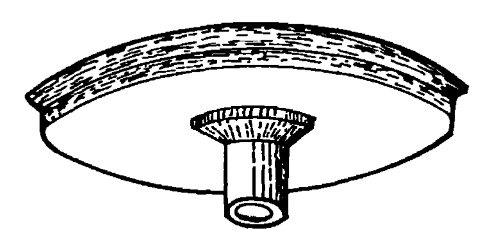


2. 1.25 cm above the base of the powder container, cut two slits, (slits 1 and 2 in the Figure) each 1.25 cm long with a knife diametrically opposite to each other. Then cut the slit 2.5 cm long and 3 mm wide vertically on one side of the container from top to bottom (remove the strip of plastic from here).
3. Place the container on the lid between the bent flaps and fold the two flaps into the container through the slits so as to hold the container tightly fixed to the tin lid.

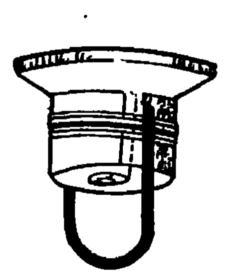


20

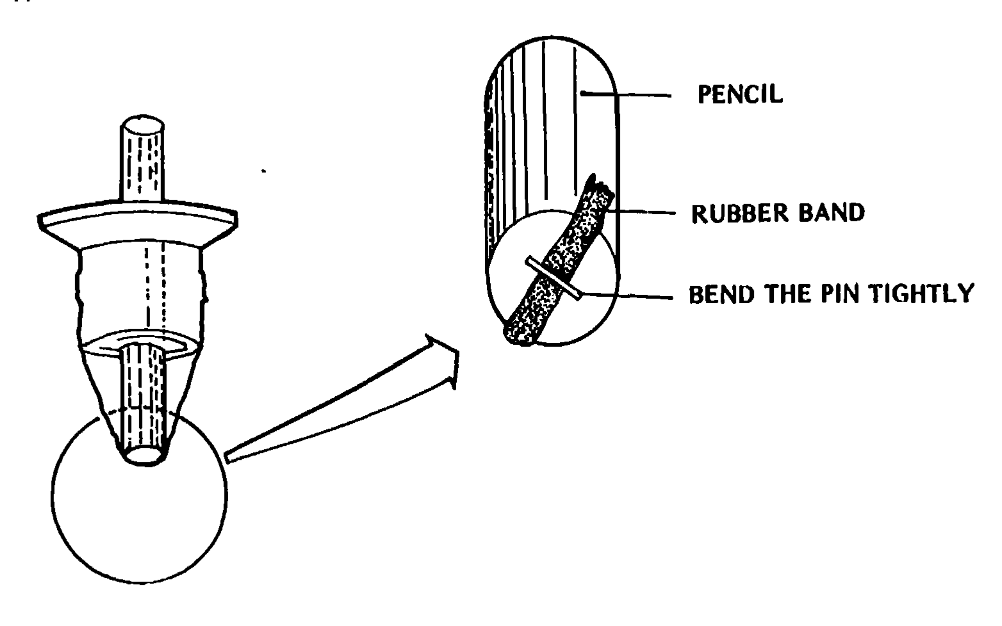
4. Cut the cotton reel into two at the middle and paste one half to the other tin lid with suitable adhesive.



5. Tie the two ends of the valve tube tightly with a string (about 7.5 cm long) onto the two sides of the cylindrical portion of the other half of the (cut) cotton reel.

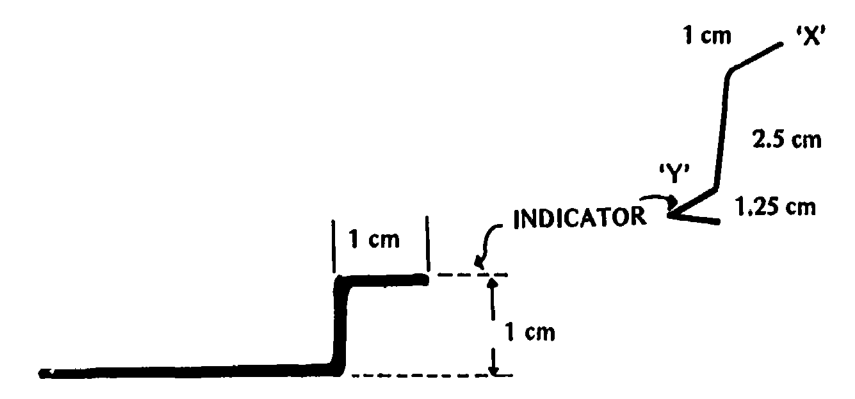


6. Pass the pencil through the cotton reel and fix the rubber band to the end of the pencil with a pin driven into the pencil (bend the pin tightly).

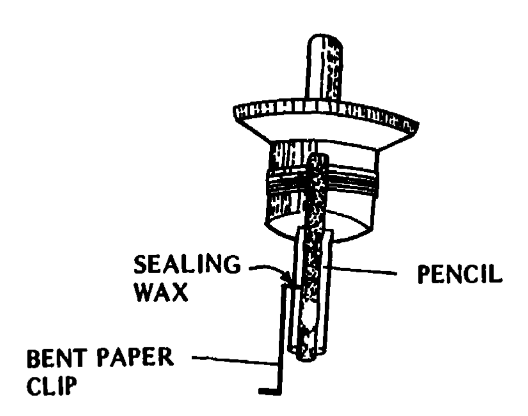


7. Straighten the paper clip and make the shape shown below.

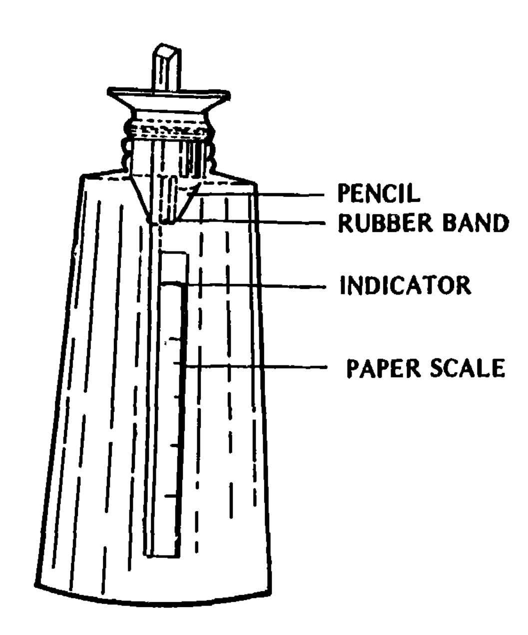
1.25 cm away from bend 'Y', make another bend (at right angles) side-ways (left or right).



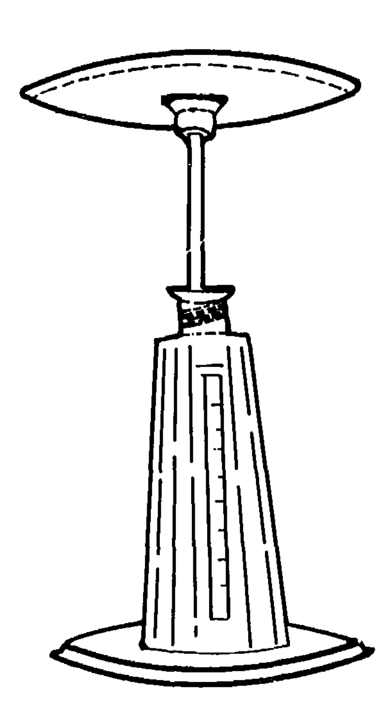
8. About 1.25 cm from the end of the pencil (with valve tube), make a hole carefully with the point of a divider to take 'X' of the bend paper clip. Fix the paper clip as shown and fasten by using sealing wax.



9. Carefully insert the paper clip into the powder container and pass the end of the paper clip carefully out from the vertical slit already cut on the side of the container and the 'indicator' will emerge out from the slit. Now carefully fix the cotton reel into the neck of the container.



10. Now fit the upper pan to the other end of the pencil and the completed balance would look like. . . .



11. Select suitable weights and using them, calibrate the scale on a strip of paper pasted to the side of the vertical slit at the side of the container.

5. HOW TO USE

1. Weights of objects may be read out on the scale by placing the objects on the upper part.
2. The whole balance could be dismounted easily for easy carrying.

Note: There should be least friction between the pencil and the cotton reel. However, the pencil should not be too loose to the reel.

The range of the balance may be altered by using a different size of rubber band or a cord.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys" prepared by Mr. P.B. Dayasiri, Curriculum Development Centre, Sri Lanka.*

SHEET 69

RURAL REFRIGERATOR

1. OBJECTIVE

To show how near freezing temperature (8°C) can be maintained without electricity.

2. MATERIALS USED

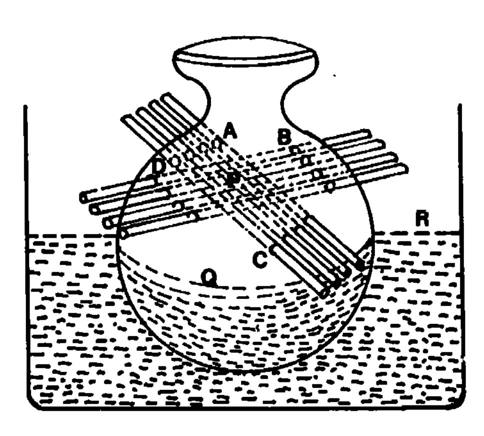
An earthen pot with holes at the top end of the round section, thin bamboo sticks, sand, water, common salt, ammonium chloride and potassium chloride.

3. HOW TO MAKE

Prepare an earthen pot with holes at the top round section through which thin bamboo sticks can be inserted across to come out on the opposite side. Sticks are to be longer than the diameter of the pot. If this arrangement is made at four ends, ABCD of the pot, then a flat platform P is created in the pot on which milk, fruits, vegetables can be kept. Below this level is water Q mixed with ammonium chloride, potassium nitrate and sodium chloride in the ratio of 1 : 2 : 3. The pitcher is surrounded by wet sand R.

4. HOW TO USE

The refrigeration system is ready to preserve milk, fruits and vegetables etc.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in India" prepared by Dr. M.M. Chaudhri, Head, Department of Teaching Aids, National Council of Educational Research and Training, India.*

SHEET 70

WAVE MOTION

1. OBJECTIVE

To show the concept of wave motion where particles of medium oscillate about their own position.

2. MATERIALS USED

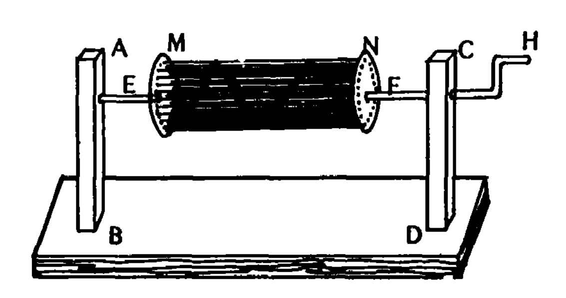
Wood, wooden (or lacquer) balls, bicycle spokes, and a 40 watts bulb.

3. HOW TO MAKE

1. Two wooden stands AB and CD are fixed on a wooden base.
2. Two wooden discs M and N are joined together with about 30 cm. of bicycle spokes in a circular or cage manner.
3. Spherical balls or beads are fixed on the rods holding M and N at regular intervals.
4. A thicker wooden rod passing through the centres E and F of M and N pass through the stands AB and CD and the entire assembly can be rotated through a handle H.

4. HOW TO USE

1. From a ray of light taken from a 40 watt bulb, light is made to fall on this apparatus and its image is projected on a plane wall.
2. When the discs M and N are rotated with handle H, the wave motion can be observed on the wall through the up and down movement of the spherical balls.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in India" prepared by Dr. M.M. Chaudhri, Head, Department of Teaching Aids, National Council of Educational Research and Training, India.*

SHEET 71

DEMONSTRATION MODEL OF A WATER PUMP

1. OBJECTIVE

To show how rotational energy (mechanical or electrical) can lift water from a lower lever (river) to a higher level.

2. MATERIALS USED

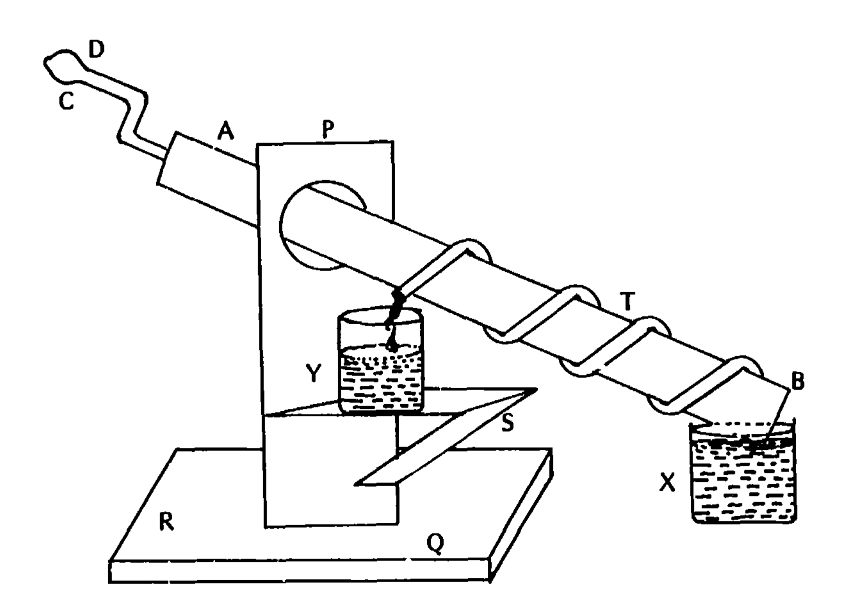
Wood, nails, plastic tube and wire.

3. HOW TO MAKE

1. Take a 35 cm long and 5 cm diameter wooden rod AB. Fix a handle CD.
2. Prepare a flat stand PQ mounted on a base R and a platform S on which a small vessel (beaker) can be placed.
3. Take a plastic tube about 60 cm long and 1 cm or 1.5 cm in diameter. T and wrap it around the wooden rod AB holding it in place with a thin wire.
4. Place another vessel X with water in which the end B is dipped.

4. HOW TO USE

By rotating handle CD, the rod AB rotates around stand PQ in the vessel X. The water enters in the open end of the plastic tubing. As the rod AB rotates, the water entering into the plastic tube keeps climbing up as it moves from a lower level in the tube to a higher level and finally emerging out from the top end and dropping into vessel Y.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in India" prepared by Dr. M.M. Chaudhri, Head, Department of Teaching Aids, National Council of Educational Research and Training, India.*

SHEET 72

ROLLING STICKS

1. BRIEF DESCRIPTION

Children often see the sticks, but many of them may not have seen them rolling to-and-fro if they are cylindrical. This device allows the children to roll several sticks on a curved platform and thereby observe them moving to-and-fro. The familiarization with this phemomenon will facilitate the grasp of the concept of periodicity.

2. OBJECTIVES

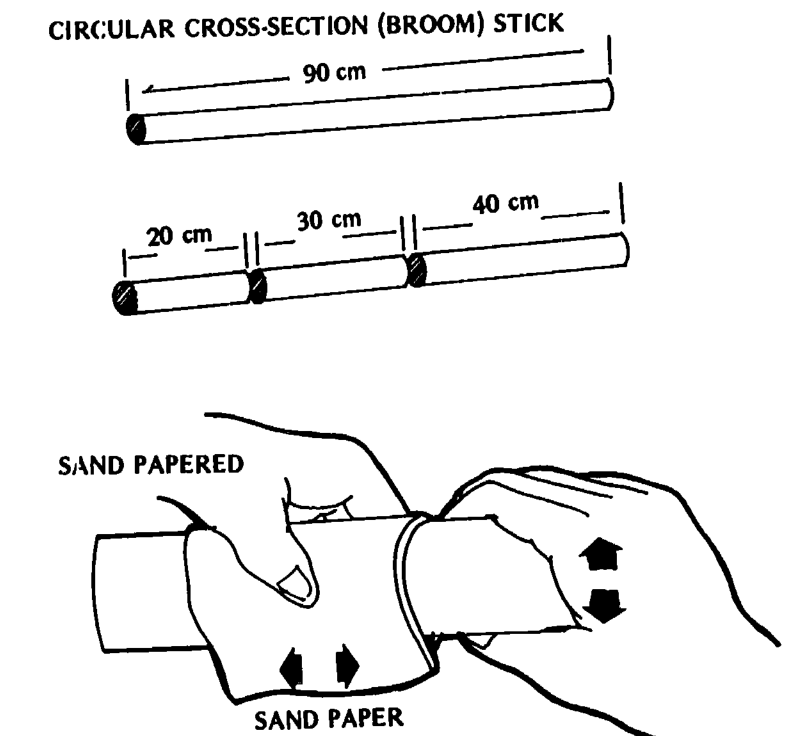
1. To demonstrate the relationship between the length and weight of rods to the rate of motion.
2. To observe the independent variable, the length of the rod and dependent variable and the number of times it oscillates.

3. MATERIALS USED

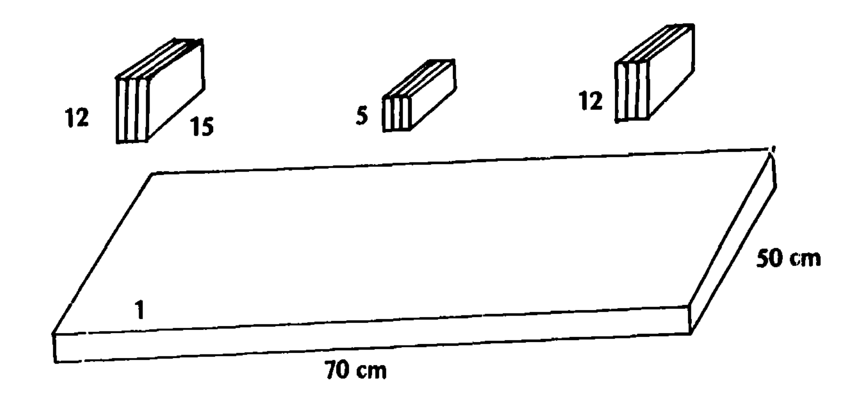
Plywood (50 cm x 100 cm.), cylindrical rods (such as a piece of broom stick), two mild steel strips or bamboo strips (50 cm), sand paper, and some simple tools (hammer and nails).

4. HOW TO MAKE

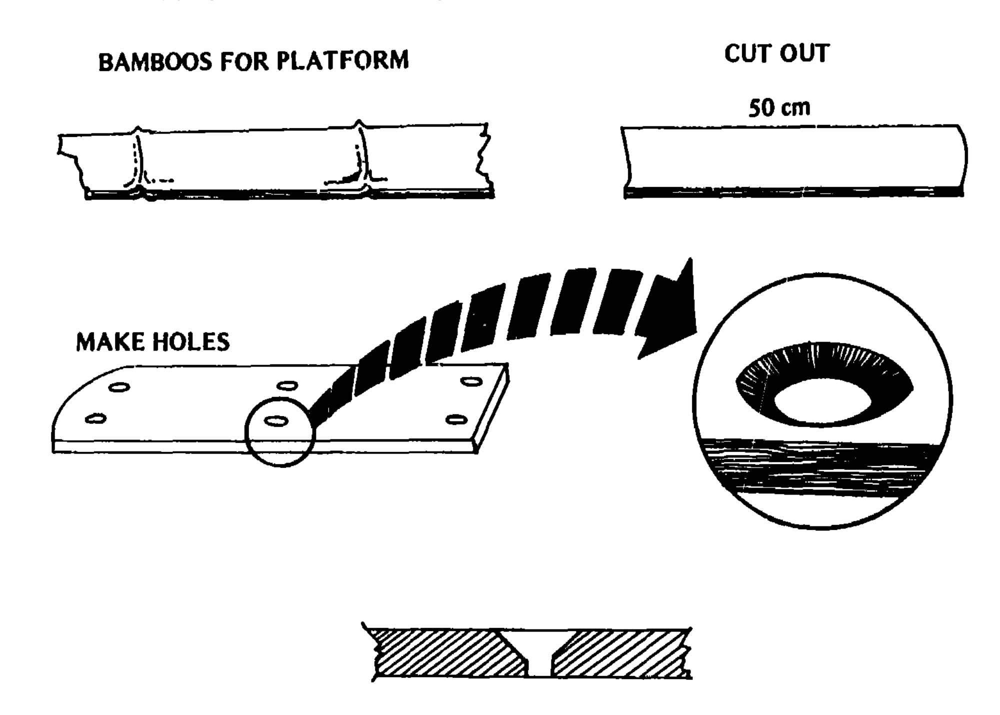
1. Take a piece of cylindrical rod (broom stick, etc.) that has a circular cross-section and cut it into lengths of 20 cm , 30 cm and 40 cm. Sand paper the surface so that it is very smooth.



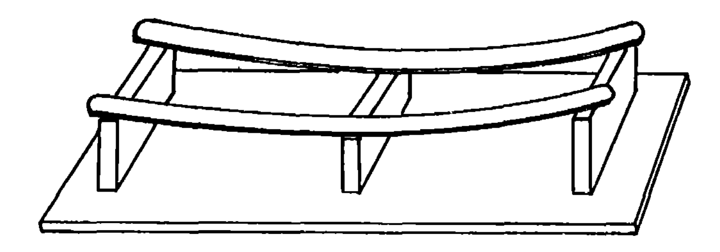
2. Cut out a plywood base of 1 cm, thick, about 70 cm long and 50 cm wide. Also cut out other pieces as described below.



3. Prepare two mild steel strips for the platform. The strips should not be too thick (about 3 or 4 mm thick and 1.5 cm wide). As an alternative, prepare two bamboo strips as described below.

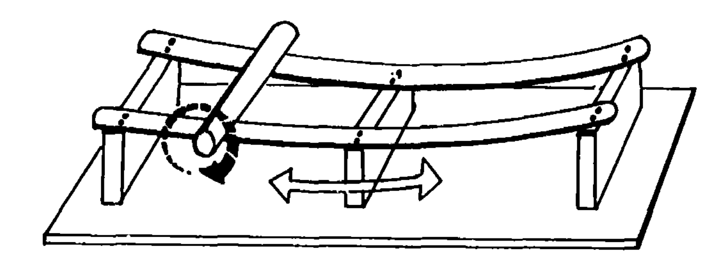


4. Fix the platform (metal or bamboo) on the base.



5. More cylindrical rods of varying diameters and materials can be added when the need arises.

5. HOW TO USE



1. Let the children play with it and ask them to tell you what they see.
2. Ask them whether rods of other shapes will also oscillate. Whether they say yes or no, immediately after they have responded, invite them to test their prediction.
3. Ask them if two rods are held together at one extremity and released simultaneously whether they will move together or separately. Ask them to test their prediction.
4. Will other rods with circular cross-section but varying in size and material, behave in the same manner?

   (This is another problem that can be posed. The oscillation is a dependent variable which is related to a number of independent variables. This device allows for increasing the number of independent variables and thereby making the task increasingly complex).

Source: *"An Instruction Sheet" developed by the participants of a Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kuala Lumpur, 5-15 December, 1977.*

SHEET 73

RELATIVE THERMAL CONDUCTIVITY OF SOLIDS

1. OBJECTIVE

To demonstrate that different solids conduct heat differently.

2. MATERIALS USED

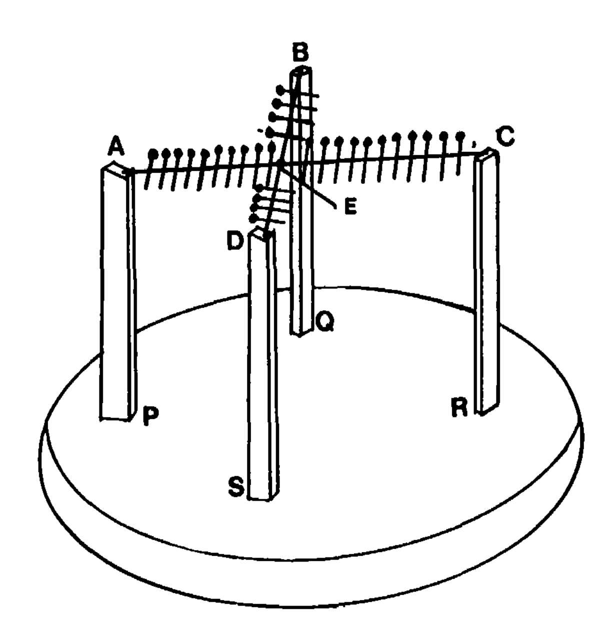
Wires of different materials but with the same thickness such as copper, iron, aluminum etc, pieces of wood and wax.

3. HOW TO MAKE

1. Prepare three or four wooden pillars AP, BQ, CR, and DS and mount them on a wooden board.
2. Four wires of equal length may be taken.
3. Tie one end of each at the top of the pillar with a nail.
4. Join them all at a central point E so that all wires are of equal length.
5. Several match-sticks are placed on the wires at equidistance with wax.

4. HOW TO USE

1. The point P is heated with a match stick or candle.
2. As heat begins to travel to points A, B, C and D, different match-sticks will fall, depending on which wire conducts heat faster. This demonstrates the relative thermal conductivity of the solids.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in India" prepared by Dr. M.M. Chaudhri, Head, Department of Teaching Aids, National Council of Educational Research and Training, India.*

SHEET 74

EXPANSION OF SOLID

1. BRIEF DESCRIPTION

This is a simple experiment kit to show a group of pupils the phenomenon of expansion of metal.

2 OBJECTIVE

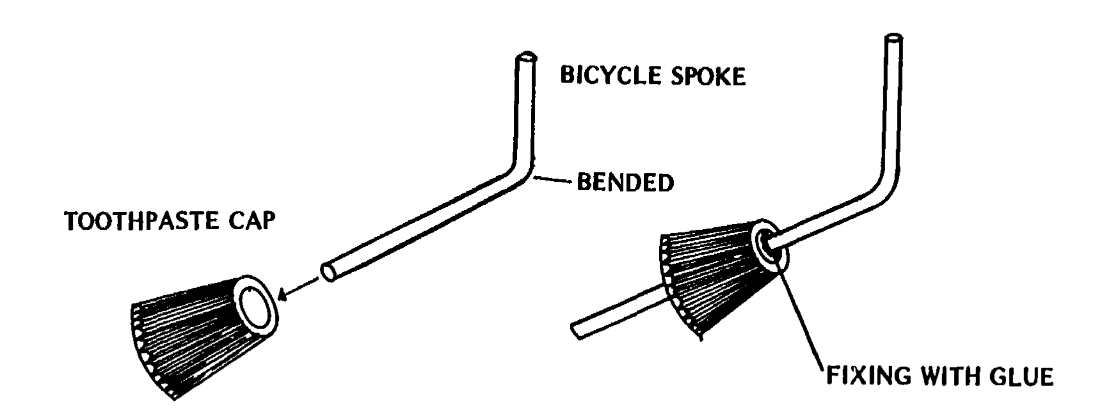
To demonstrate to the primary/secondary school children the phenomenon that metals expand on heating and contract on cooling.

3. MATERIALS USED

Blocks of wood, plywood (15 cm. x 30 cm), used hacksaw blade, toothpaste cap, bicycle spoke (or thick wire), a piece of thick paper and nails.

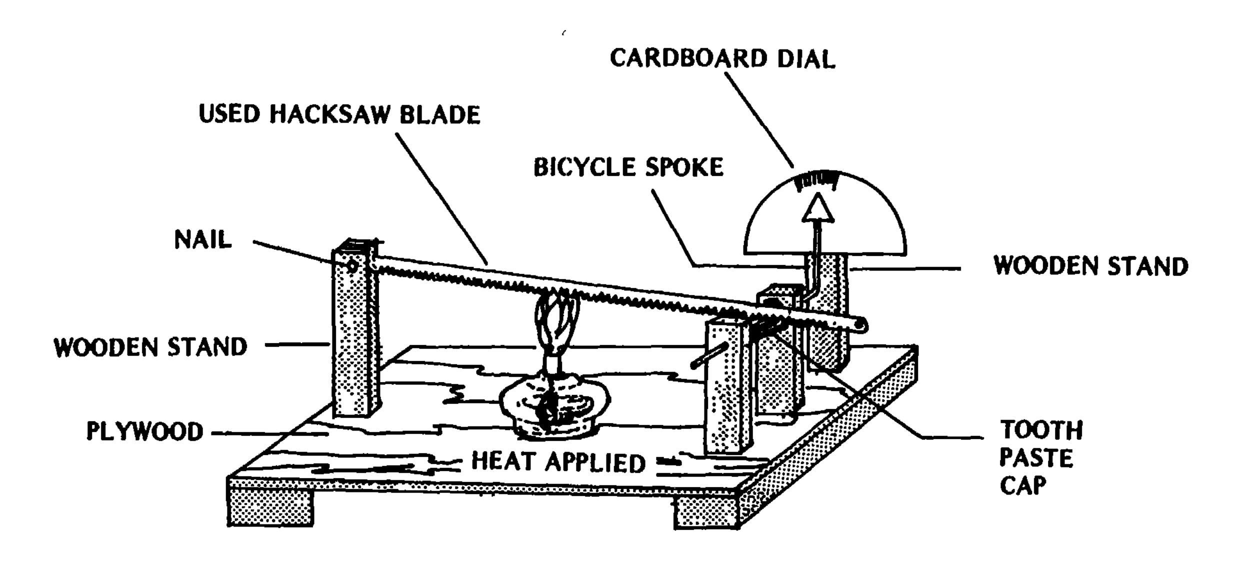
4. HOW TO MAKE

1. Take a 5 mm thick plywood piece. (about 15 cm x 30 cm)
2. Cut four wooden blocks. (2.5 cm x 1.5 cm x 15 cm)
3. Cut two wooden blocks. (2.5 cm x 1.5 cm x 10 cm)
4. Nail two pieces of 15 cm length at the bottom of the plywood wood to make a stand.
5. Take one wooden block 15 cm in length and make a slit of 1.5 cm with a saw at one end. Put one end of the blade inside it (with teeth downwards). Put a nail through the hole of the hacksaw blade.
6. Take a bicycle spoke 20 cm long. Insert the wire into the toothpaste cap to make it a gear (wheel), 6 cm from one end. Rotating the wire should rotate the cap and vice-versa.



7. Drill two holes at the centre in the 10 cm long wooden blocks, 1.5 cm from the top. Insert the wire into the holes of the two blocks so that the plastic cap comes between the two blocks. Bend the wire at about 10 cm.
8. Nail the last block of 15 cm length. Attach a semi-circular dial on it so that the vertical wire-end can move along the graduated scale.

9. Rest the saw on the toothpaste cap. It is fixed at one end and free to move on the cap at the other.



(TO DEMONSTRATE THE PHENOMENON OF EXPANSION OF METAL WHEN HEATED)

5. HOW TO USE

When heated with candle or spirit lamp for a little while, the blade expands, rotating the cap which moves the wire on the dial to show changes. The wire-end moves on the right when heated. On removing the heat source, the pointer returns back to its original position.

Source: *"An Instruction Sheet" developed by the participants of a Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kuala Lumpur, 5-15 December 1977.*

SHEET 75

WATER WHEEL

1. OBJECTIVE

To demonstrate the principle of action and reaction.

2. MATERIALS USED

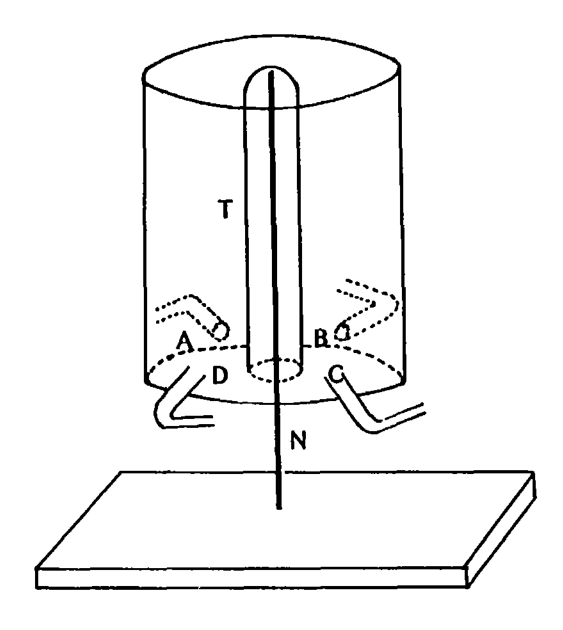
Tin can, small tubes of tin which can be soldered/welded to can, bicycle spoke and a piece of wood.

3. HOW TO MAKE

1. Take a tin-can opened at one end and make four small holes ABCD at the bottom, diagonally opposite to each other.
2. Drill a hole 2 cm in diameter at the centre of the bottom of the can.
3. Prepare (in a rural metal shop) four tubes about 2 cm in length and bend them half way at right angles.
4. Weld the four tubes in the four holes so that they all point in a direction which is either clockwise or anti-clockwise.
5. Make a tin tube T (test tube) and of the length of the can.
6. Weld the tube T in an inverted manner inside the can.
7. Mount a bicycle spoke N (length greater than tin can) on a wooden stand.

4. HOW TO USE'

When water is filled in the can, it starts coming out of the four tubes. Because of the direction it is constructed, the can rotates on the axis.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in India," prepared by Dr. M.M. Chaudhri, Head, Department of Teaching Aids, National Council of Educational Research and Training, India.*

SHEET 76

INSTRUMENT TO SHOW HOT AND COOL AIR CURRENTS

1. BRIEF DESCRIPTION

When air is heated, it becomes lighter and is replaced by heavier air, i.e. cold air. The replacement of hot air by cold air generates an air current. This can be shown by the rotary movement of the instrument.

2. MATERIALS NEEDED

Sheet of paper approx. 9" x 12" (23 x 31 cm.), electric bulb, light socket and extension cord, stiff wire, scissors, emtpy can approx. 3½" (9 cm) in diameter and end piece of a distilled water ampoule.

3. HOW TO MAKE

1. Cut one side of the sheet of paper as shown in Figure 1.

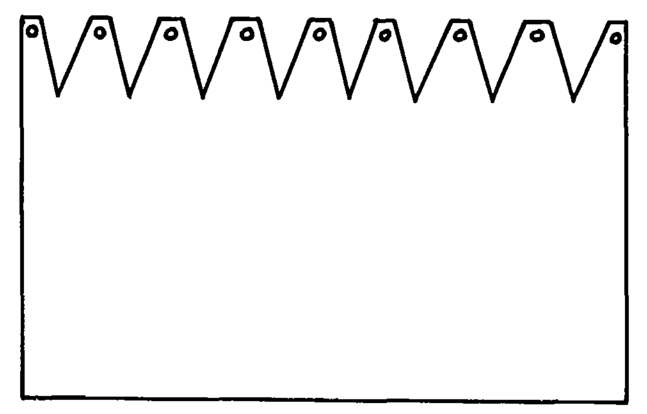


FIGURE 1

2. Close all the teeth together over the ampoule tip, thus forming a canopy, as shown in Figure 2. Glue the sides together.

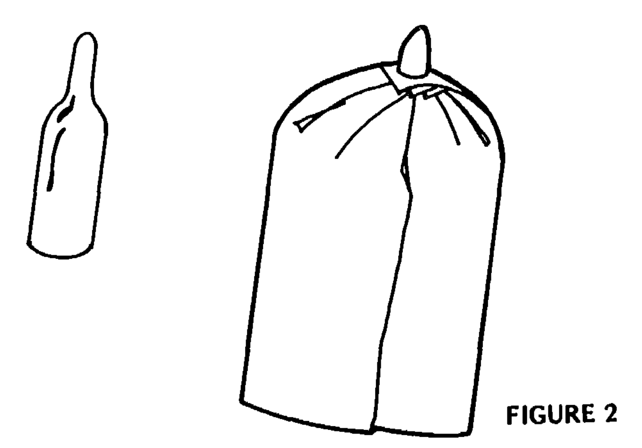


FIGURE 2

3. Tie the metal wire around the bulb and extend it to the top, into the ampoule. Place the bulb inside the empty can. (see Figure 3)

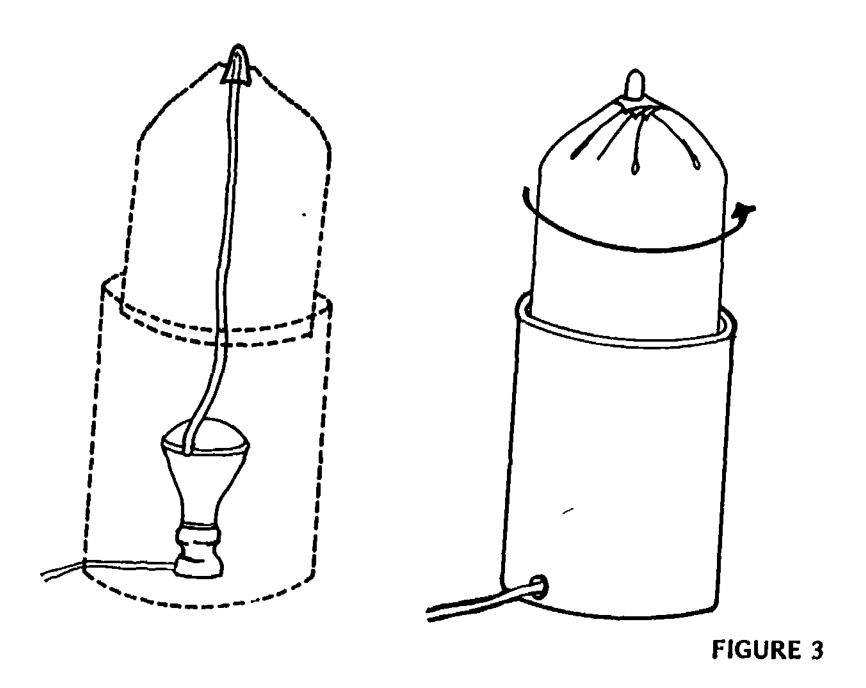


FIGURE 3

4. Balance the canopy on the wire, either inside or outside the can.

4 HOW TO USE

Turn on the current to light the bulb. The paper canopy will start revolving around the pivot, showing the movement of hot and cold air.

Source: *"An Instruction Sheet," developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to the Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 77

SOUND TRANSMISSION IN VACUUM

1. BRIEF DESCRIPTION

This is an instructional material making use of assembled local materials to perform an experiment on the transmission of sound.

2. OBJECTIVE

To develop a local device to prove whether sound travels in a vacuum.

3. MATERIALS NEEDED

A wide bottle with a small mouth, a cork, piece of small stick, water, heating device and a small bell.

4. HOW TO MAKE AND USE

1. Place a small bell at the end of a stick and push it through a cork. Stop the mouth of the bottle with the cork with the bell hanging upside down inside the bottle. (see Figure 1)
2. Ring the bell by shaking the bottle. Take care that the bell does not touch the sides of the bottle.

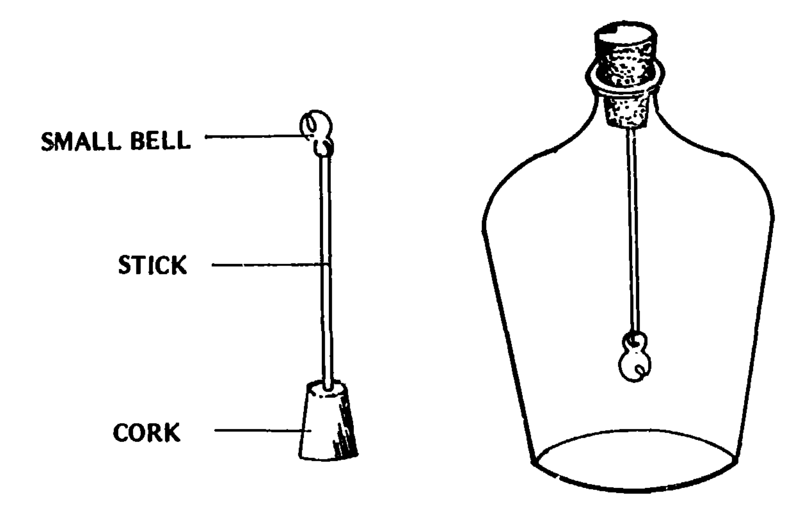


FIGURE 1

3. Remove cork from bottle. Pour water (about 25 ml) inside. Place the cork back and shake the bottle. Listen to the ringing of the bell. (Figure 2)
4. Remove again the cork. Heat the water inside the bottle by means of alcohol lamp (Figure 3) and bring it to a boiling point.

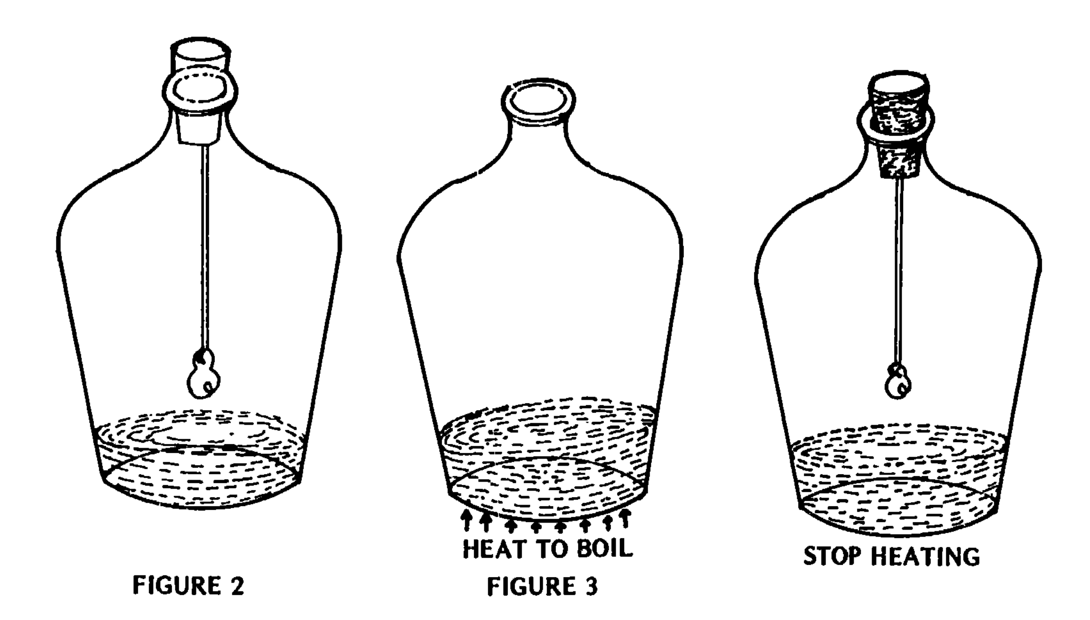


FIGURE 2

FIGURE 3

5. Cover your hands with a dustcloth to prevent it from burning and shake the bottle. Listen to the ringing of the bell. Is it faint? Or is it loud?
6. Compare the sounds of the ringing bell in the three different situations.

5. MODIFICATION

It is better to have two sets of materials to work with. It will be more convenient and the experiment can be done faster.

Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 78

MILK CARTON LIGHT BOX

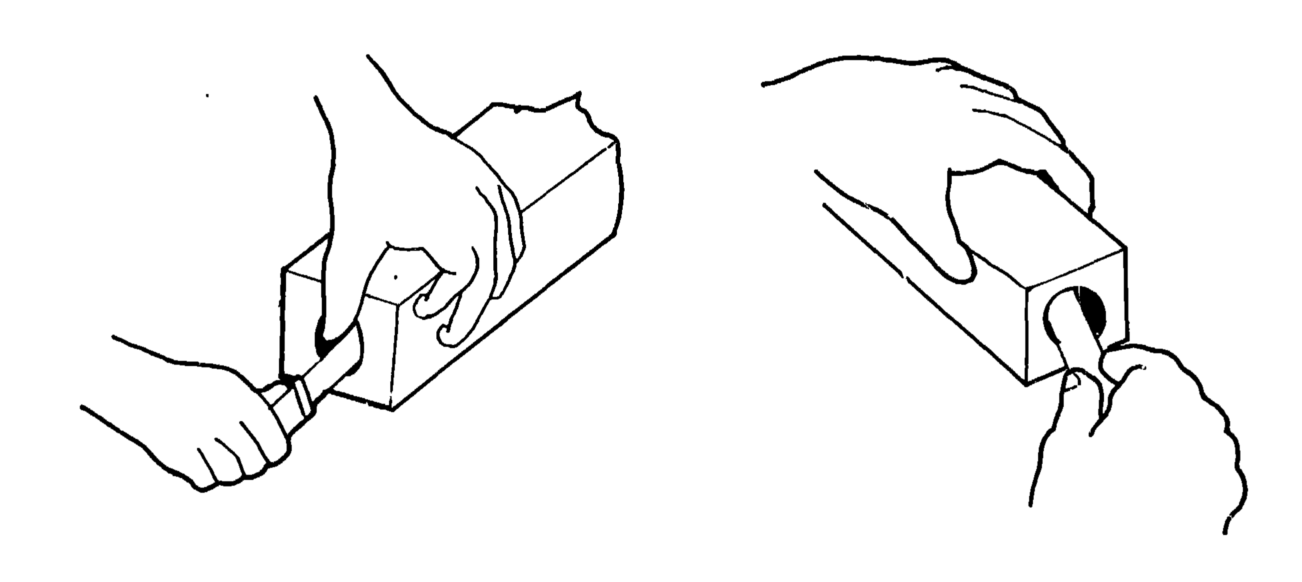
1. BRIEF DESCRIPTION

This is a simple apparatus for science experiments using materials which are easily available. It takes only a short time to construct. It is good practice for science students to experience the entire process, from making the apparatus to observing experimental results. This experiment is to observe the function of a convex lens in a light box made out of milk cartons.

Milk cartons are easy for children to handle since they are already in the shape of a box and therefore it is not necessary to construct a box. It will not make a big difference whether a child is good with his hands or not; anyone can obtain successful results.

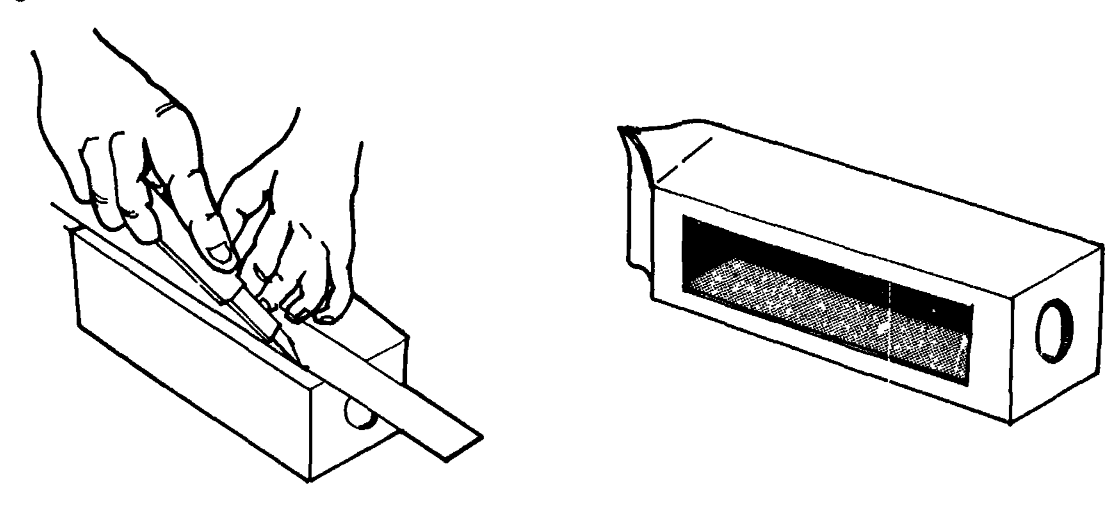
2. HOW TO MAKE

1. Make a round hole about 3 cm in diameter in the bottom of the carton. Use a cutter-knife to ensure a smooth edge and finish it off with sand-paper.



Make a round hole at the bottom of carton. Smoothen with sand paper.

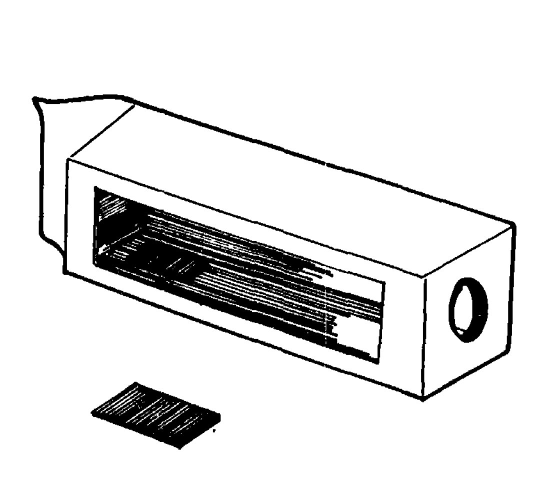
2. Make an oblong window on one side of the carton, leaving about 1 cm at all corners so that the carton will retain its strength.



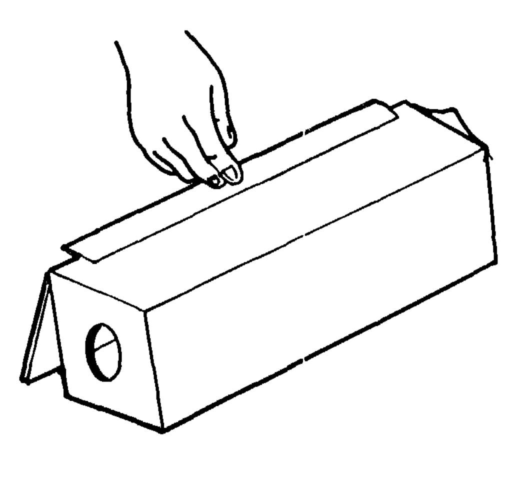
Make a large observation window on one of the longer sides of the carton.

3. Paint the inside black. Water colors or poster colors may not work directly on the inner surface. Add two or three drops of liquid detergent and use a brush, and the paint will not be repelled.

4. Allow the paint to dry. Stick a small metal plate, preferably a magnetic piece, inside. This will serve as the stand for holding a stick of incense later. Position the plate away from the round hole at the bottom.

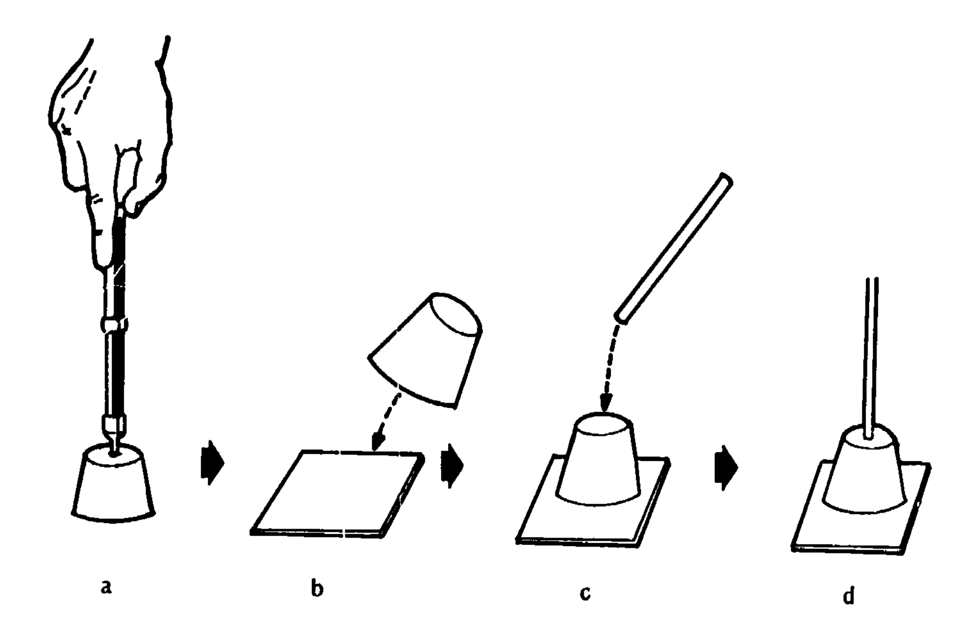


Paint the inside black and let it dry. Stick on a small metal piece inside.



Cover observation window with a film sheet. Tape securely along one side so that it will open and close.

5. Make a stand or incense-holder from a rubber stopper as described.



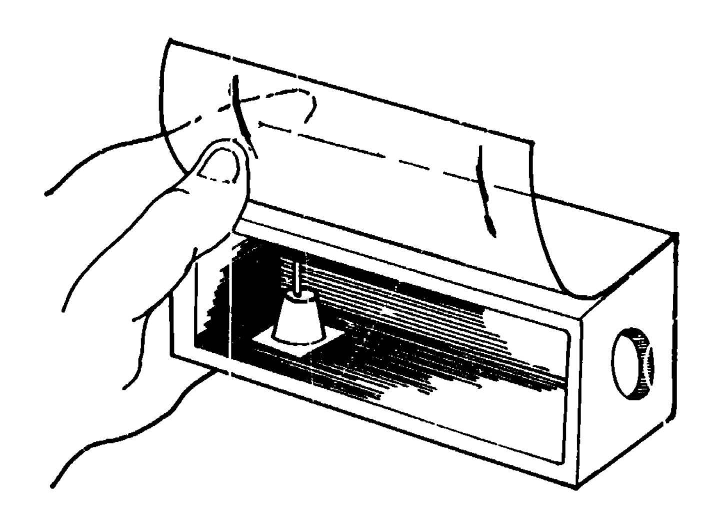
a. Bore a small hole in the rubber stopper with a gimlet or an eyeleteer. This will be for holding a stick of incense later.

b. Cut out a piece of magnetic sheet that is slightly larger than the rubber stopper and paste it under the stopper.

c. Insert a stick of incense into the stopper.

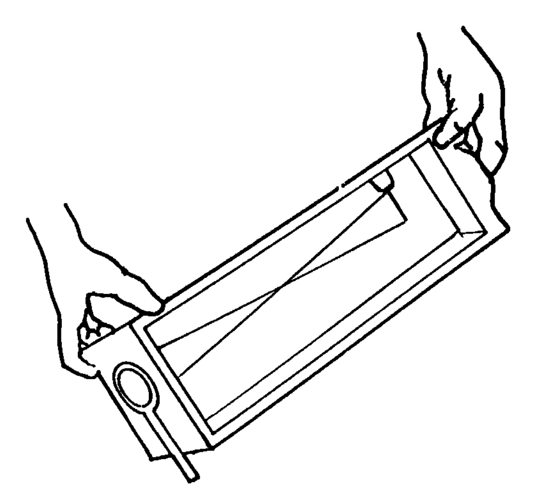
d. This will serve as the smoke-giver of this apparatus.

6. To complete the apparatus, cover the oblong window with some transparent film. Use something like a piece of transparent sheet for an overhead projector. Scotch tape along only one of the long sides and fix firmly so that it will open and close as shown below. This will be our observation window.



3. HOW TO USE

1. You will need a magnifying glass and a convex lens.
2. Take out the smoke stand and light the incense. Put it back into the box and close the film sheet on the window. Hold it down with your fingers.
3. The box will soon be filled with smoke. Hold the box so that sun rays will enter through the round hole. The magnetic sheet attached to the smoke stand will stick to the metal piece in the box and keep it from falling out as long as the box is handled gently.
4. Place the magnifying glass at the round hole. You can have a three-dimensional view of the light focusing inside the box. In other words, the sun rays will focus in a conical shape and then disperse again beyond that point.
5. You can also clearly observe the disparity in focal points for convex lenses with differing focusing lengths.
6. You can observe different focusing points by covering one-half or three-quarters of the lens with a piece of thick paper.
7. Replace the lens with a piece of glass and you can observe how light enters at an angle, forming a conical shape.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys" prepared by Mr. N. Ohsumi, National Institute for Educational Research, Japan.*

SHEET 79

PLANT PRESS

1. BRIEF DESCRIPTION

This material is good for pressing leaves and plants. It is composed of 2 pieces of plywood (or any flat wooden boards), pressed together with the leaves/plants in between. The boards have holes to facilitate ventilation.

2. MATERIALS NEEDED

Two pieces of plywood (or any flat wooden boards), 11" x 15" in size, sheets of newspaper, 2 pieces of string or rubber band to tighten the boards together, and leaves or plants to be pressed.

3. HOW TO MAKE

1. Obtain 2 pieces of plywood of equal size, 11" x 15".
2. Bore holes through the boards as seen in Figure 1.
3. Make two notches on both ends of the boards to hold the strings.
4. Place the newspapers inside the boards.

4. HOW TO MAKE

1. Place the leaves/plants carefully between sheets of newspapers and sandwich it between the two boards.
2. Tie the strings to hold the boards tightly together.
3. Leave aside to dry for a few days.
4. Open and transfer leaves/plants on to a glass plate.
5. The pressed leaves may be used in botany classes as well as for decoration.

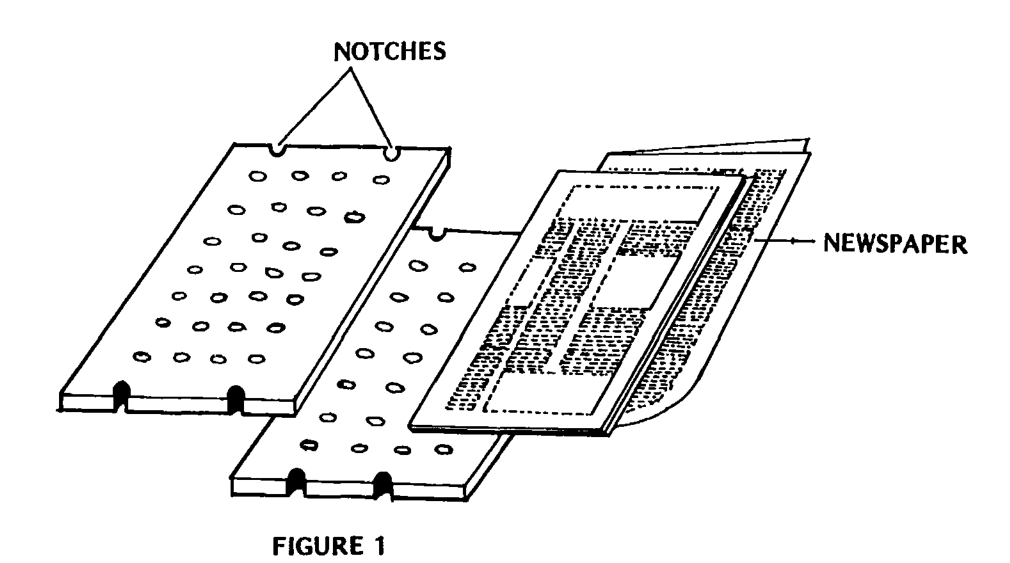


FIGURE 1

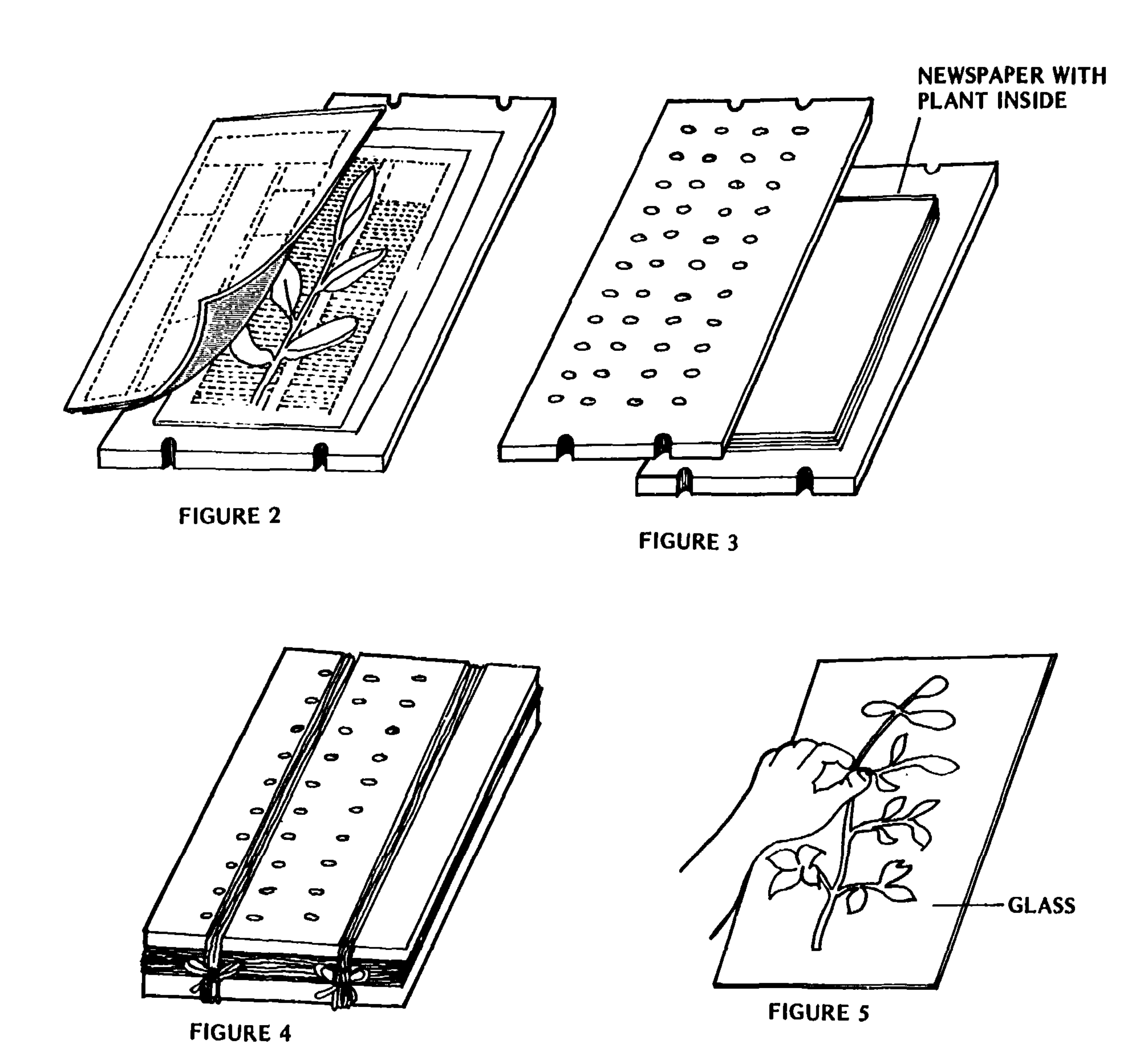


FIGURE 2

FIGURE 3

FIGURE 4

FIGURE 5

Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 17-21 November, 1978*

SHEET 80

PINHOLE CAMERA

1. BRIEF DESCRIPTION

This is a simple and inexpensive camera for developing concepts such as distance, image, and can be used as a toy.

2. OBJECTIVE

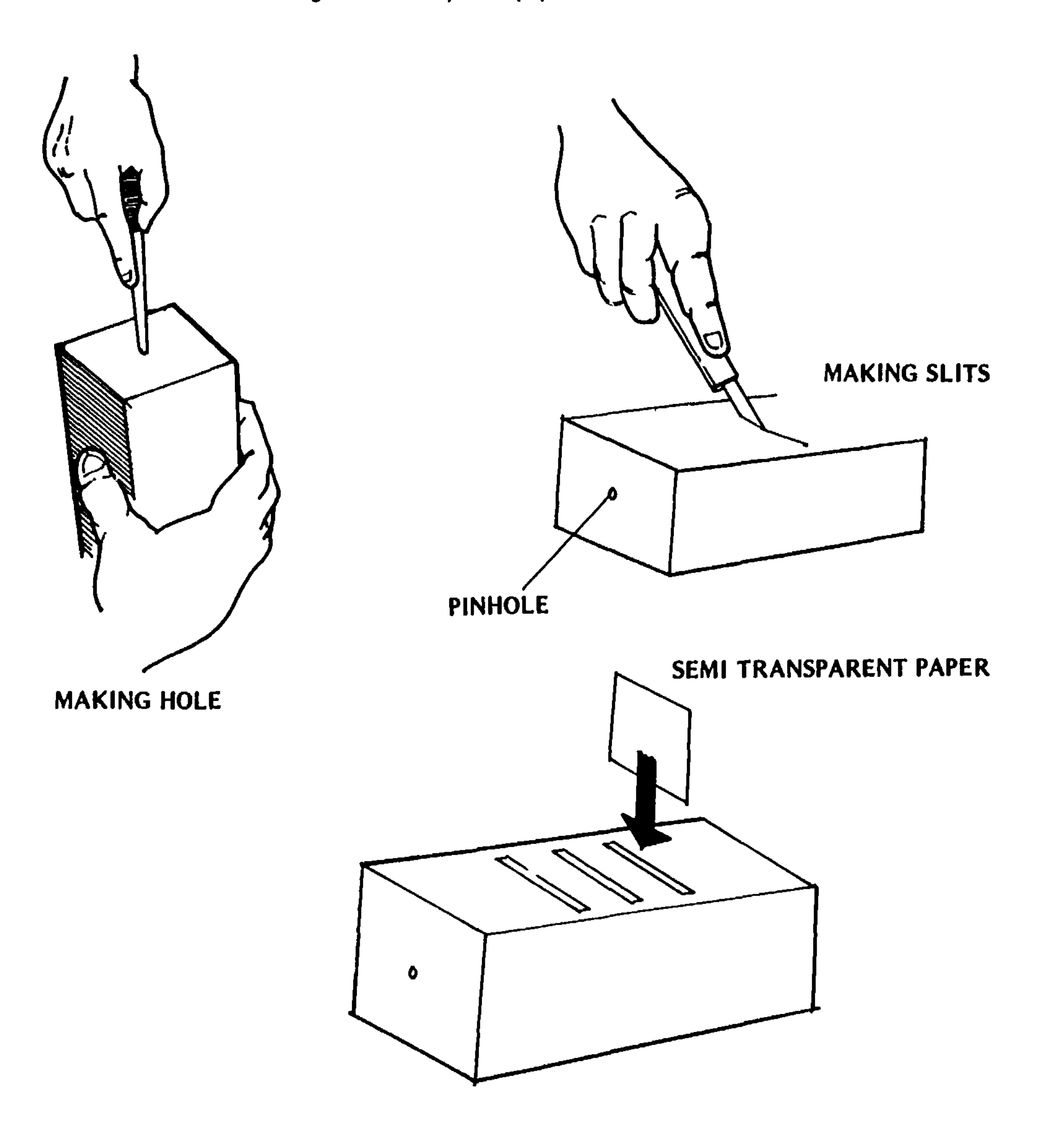
To teach the pupils about the formation of an image in relation to the distance.

3. MATERIALS USED

Used milk/fruit juice carton, or cardboard box, adhesive tape, semi-transparent paper, pin and candle.

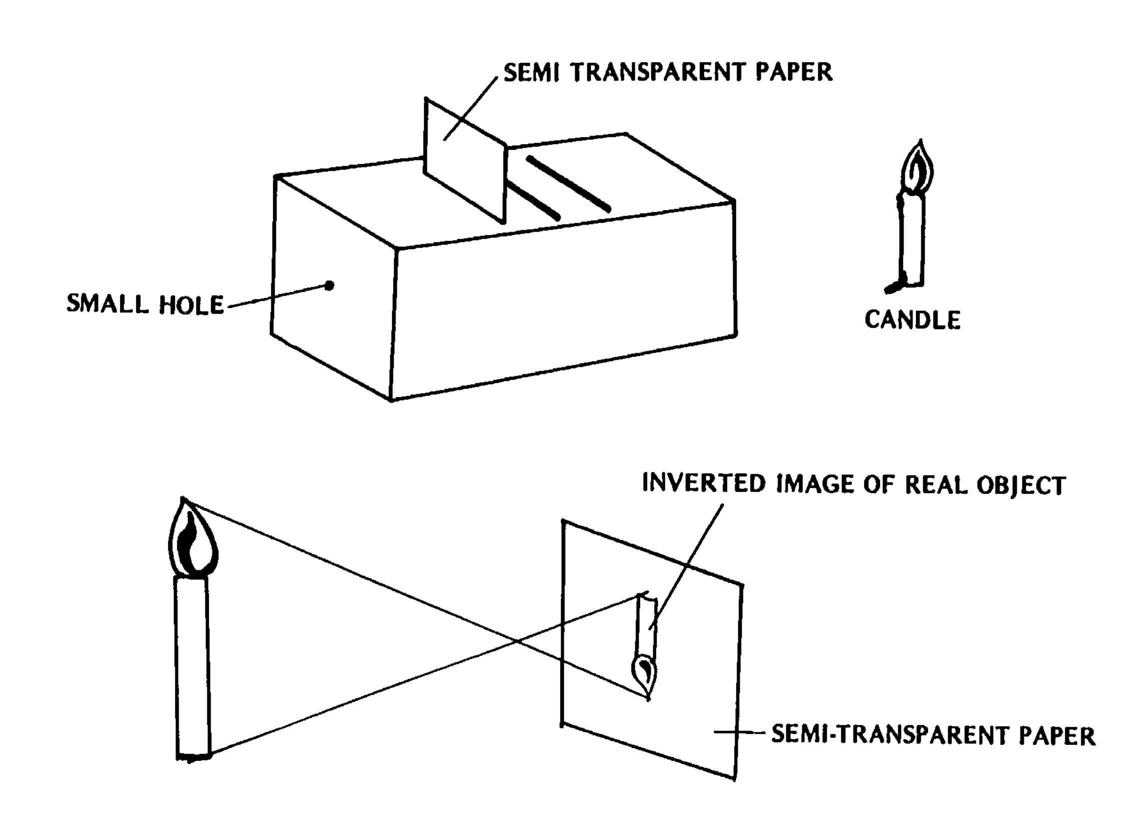
4. HOW TO MAKE

The camera-box is prepared as shown below. A small pin hole is made on one side and a small hole on the other side. Then make several slits for inserting a semi-transparent paper into the box.



5. HOW TO USE

When a candle is placed in front of the pin hole, an inverted image will be formed on the semi-transparent paper which can be seen from the small hole on the other side.



Source: *"An Instruction Sheet" developed by the participants of a Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kuala Lumpur, 5-15 December, 1977.*

SHEET 81

BUOYANCY TESTING APPARATUS

1. BRIEF DESCRIPTION

This is a simple apparatus made of bamboo which will help show the buoyancy of liquid.

2. OBJECTIVE

To show to students of the lower secondary level, the buoyancy of water.

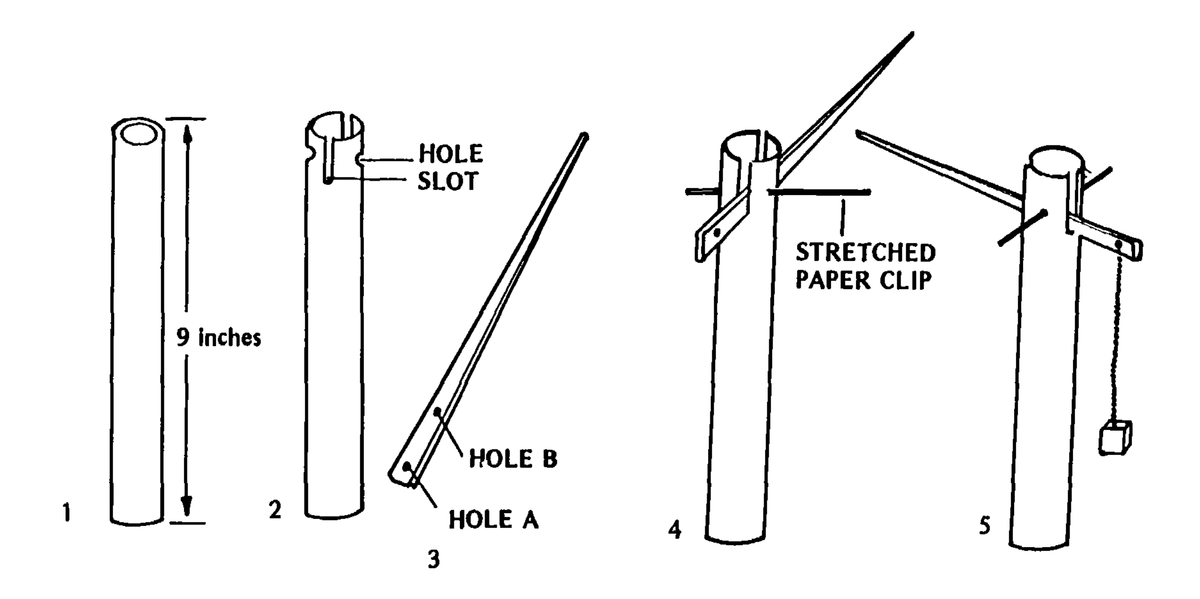
3. MATERIALS NEEDED

Bamboo tube, bamboo strip, bamboo piece, 1" square, string and paper clip.

4. HOW TO MAKE

1. Cut a piece of bamboo tube about 9 inches long.
2. Make two slots on one end by removing some parts from the middle portion. Make two holes on both sides of the slot.
3. Cut a thin strip of bamboo about 9" long. Make one end wider than the other. Pierce two holes, A and B on the wider end.
4. Place the strip across the slots and secure it by pushing a stretched paper clip through the holes in the bamboo tube and hole B of the strip.
5. Tie the piece of bamboo to a string and hang it in hole A of the strip.

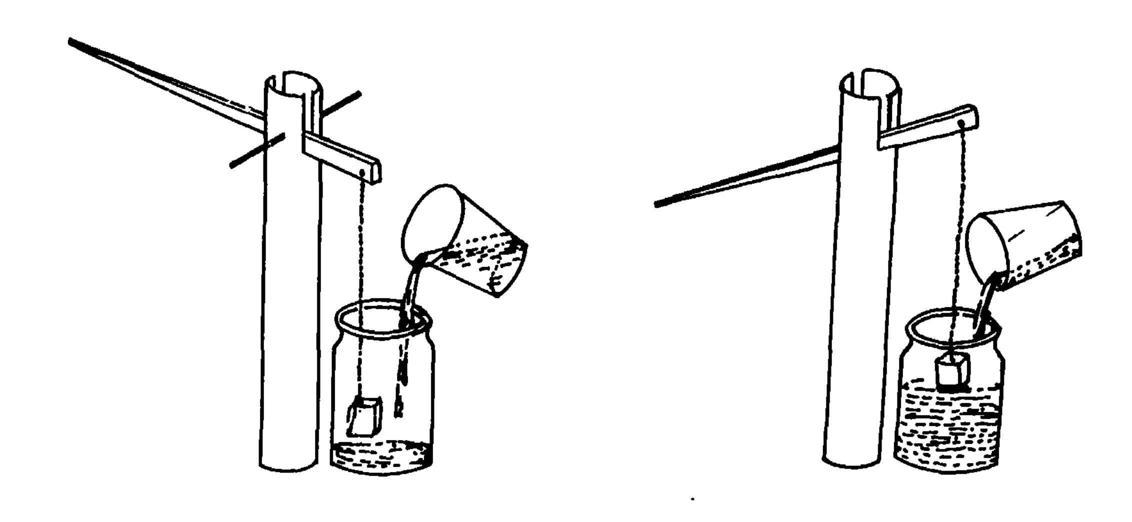
The equipment is now ready for use.



5. HOW TO USE

1. Place the hanging piece of bamboo inside a beaker or jar.
2. Fill the beaker slowly with water.

3. Observe what happens as the beaker is filled with water.



Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 17-21 November, 1978.*

SHEET 82

WATER CONDENSER

1. BRIEF DESCRIPTION

This is a simple water condenser which can be used as a substitute for Liebig's water condenser. Unlike the glass condenser, this one does not break when handled because it is made of plastic pipe and plastic tubings.

2. OBJECTIVE

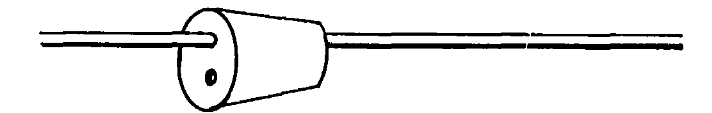
To show to students of the lower secondary level a simple process of distillation.

3. MATERIALS NEEDED

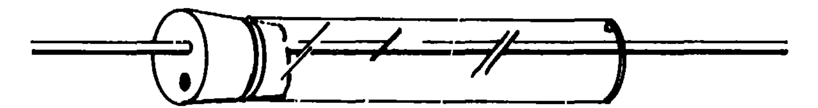
A transparent polythene pipe, 9" long (23 cm) and 1" (2.5 cm) in diameter, 1 piece of transparent polythene tubing, 2 yards (or 2 metres) long, 2 short pieces of transparent polythene tubing, 2 rubber stoppers for the pipe with two holes each through which the pieces of tubing will fit.

4. HOW TO MAKE

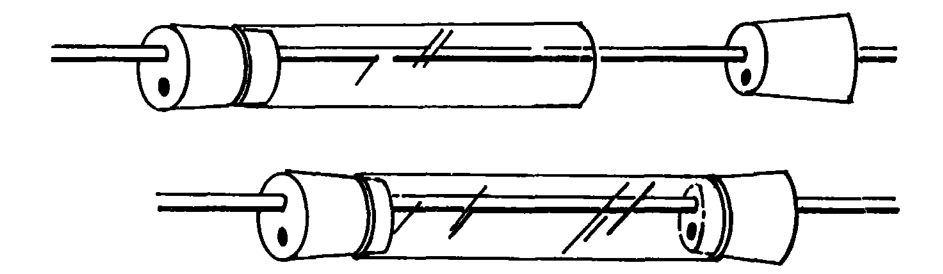
1. Insert the long polythene tubing into one of the holes in the stopper.



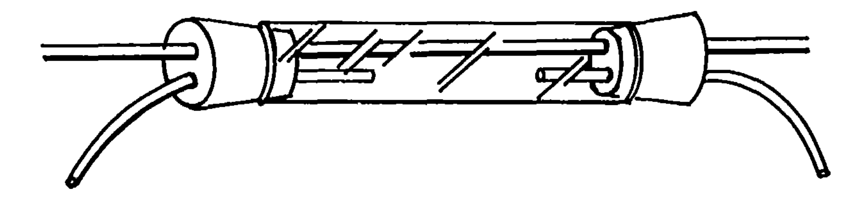
2. Fix the stopper into one end of the pipe.



3. Insert the end of the tubing that comes out of the pipe into one of the holes of the other stopper and fix this stopper into the pipe.



4. Insert the two short pieces of polythene tubing into the remaining holes of each stopper.



5. HOW TO USE

To use this condenser, connect the long polythene tubing with the distillation flask tubing. Let the cold water go into one end of the short tubing and out of the other. The circulating cold water will cool the liquid being distilled.

6. MODIFICATION

If polythene (or glass) pipe is not available, a bamboo tube will make a good substitute.

Source: *"An Instruction Sheet" developed by the participants of the First Sub-regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kathmandu, 7-21 November, 1978.*

SHEET 83

ELECTROSCOPE (ALUMINIUM FOIL)

1. BRIEF DESCRIPTION

A simple device to demonstrate the production of static electricity due to friction (two types of electric charges).

2. OBJECTIVE

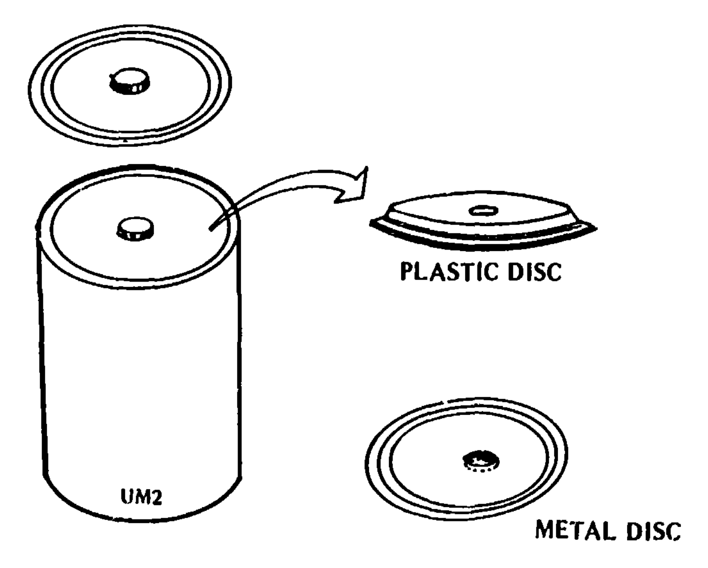
To prepare a simple electroscope for demonstrations on static electricity.

3. MATERIALS USED

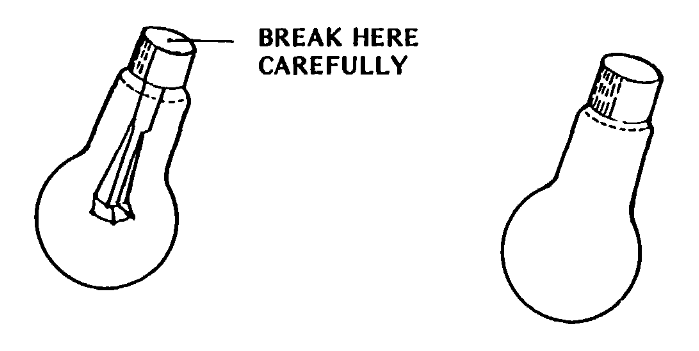
A used, household electric bulb (clear type), plastic insulating disc from the top of a used dry cell (leak-proof UM-2), metal disc from the bottom of a used dry cell (leak-proof UM-1), a tapered plastic cap to fit the inside of the brass base of the bulb (UM-1), brass rod (1.5 mm in diameter and 10 cm long), solder and flux, rubber based gum (chemlfix) and a thin aluminium foil.

4. HOW TO MAKE

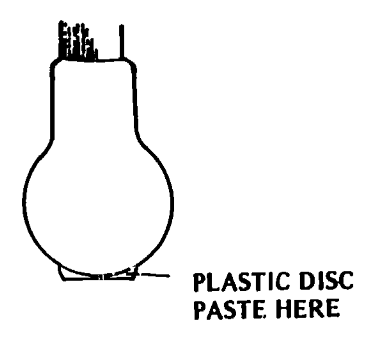
1. Remove the plastic disc (washer) and metal base from the dry-cell (UM-2).



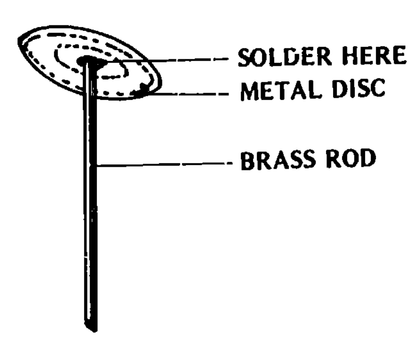
2. CAREFULLY break the bottom of the electric bulb at the terminals and remove the internal filament leads and glass supports and obtain the empty glass-tube with the brass base intact.



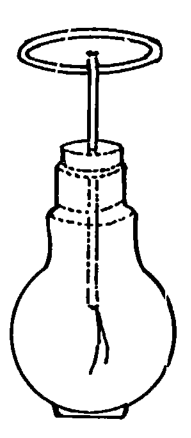
3. Paste the plastic disc from the dry-cell to the glass bulb at the centre so as to keep the bulb vertical as a flat-bottomed flask.



4. Solder the brass rod to the center of the metal disc from the dry-cell.



5. Complete the electroscope assembly as shown and pour candle wax into the plastic (tapered) cup, keeping the brass rod vertical.



5. HOW TO USE

1. See that the interior of the bulb and the brass rod assembly are perfectly dry.
2. Make sure that the two aluminium strips are suspended freely from the brass rod.
3. Bring close to the metal disc on the top, a statiscally charged object and observe the behaviour of the strips.
4. Touch the metal disc with the charged object and observe the strips again and then touch the disc now with the finger and observe the nature of behaviour of the strips.

Note: Charged objects may be a piece of polyvinylchloride (PVC) piping rubbed with a dry sheet of polythene.

Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys" prepared by Mr. P.B. Dayasiri, Curriculum Development Centre, Sri Lanka.*

SHEET 84

SPIRIT LAMP

1. BRIEF DESCRIPTION

The ordinary spirit lamp involves the use of an ordinary sootless flame for heating purposes. This aid can be used in teaching science and other subject areas as a heat source.

2. OBJECTIVES

1. To utilize scrap or low-cost materials in making a spirit lamp needed as a heat source in many teaching-learning situations;
2. To use a spirit lamp that would consume low-cost available fuel and produce a flame hot enough to heat 10 ml of water in a test tube from room temperature to boiling point in about five to eight minutes.

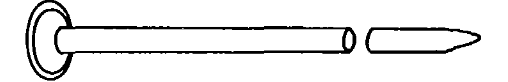
3. MATERIALS USED

Soft drink bottle cap, tin sheet, tall empty bottle with metal screw cap (like an ink bottle), simple tools (like hammer), a block of wood, cotton thread or cotton woool, thin plastic sheet and some sand.

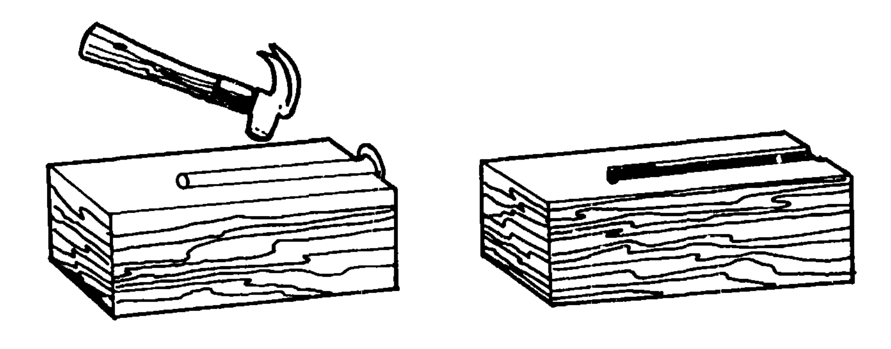
Note: The materials may be selected depending on their availability. If the available bottle is fairly tall, in order to maintain stability, half of the bottle may be filled with sand. This procedure not only compensates the height but also reduces by half the volume of fuel needed. A disc of plastic sheet may be introduced into the bottle to divide the sand from the cotton. This is also to prevent contamination of wick from sand.

4. HOW TO MAKE

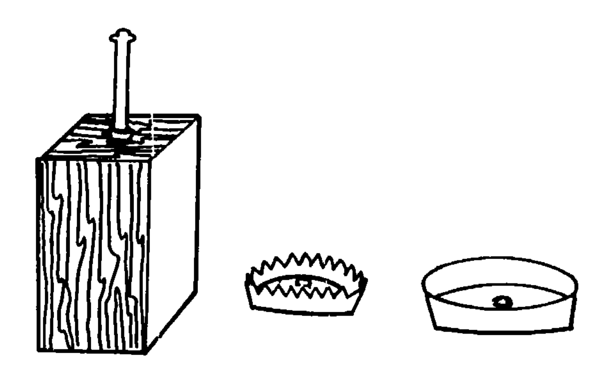
1. Cut the nail to remove the pointed end.



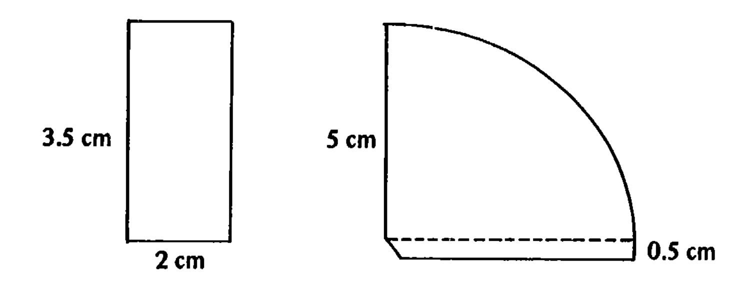
2. Place the nail lengthwise on the wooden block and hammer it in to make a groove.



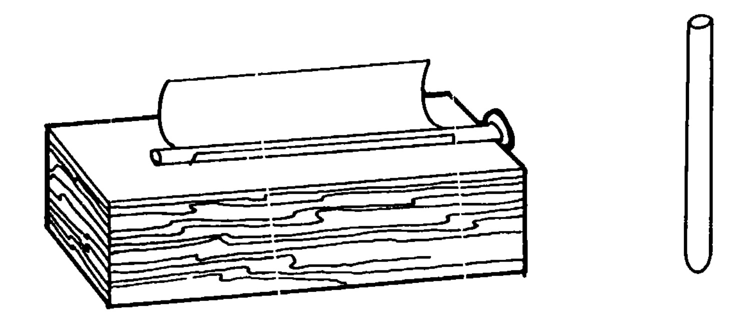
3. Make a hole in the centre of the bottle cap using the cut end of the nail. It is important that the bottle cap be placed on one end of the block in such a way that the pressure of the hammer follow the lengthwise direction of the wood grain. Do likewise with the soft drink bottle cap.



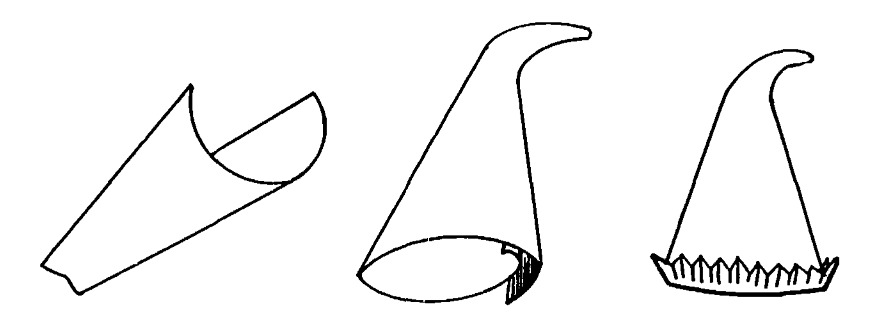
4. Cut the two pieces of tin sheets according to the specifications in the diagram shown in the picture.



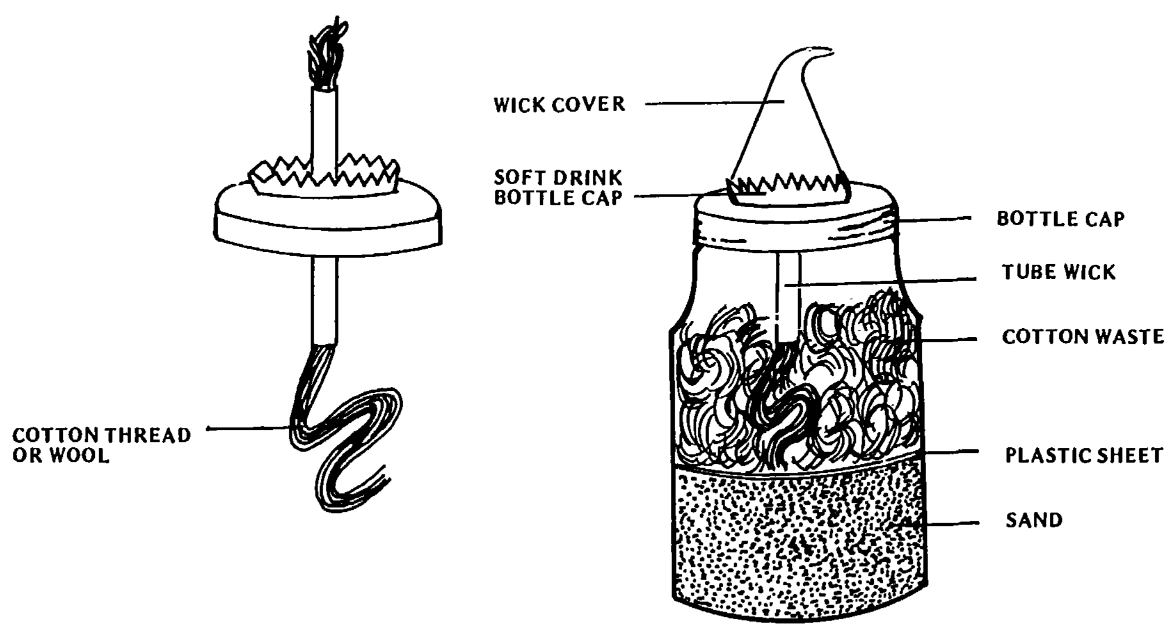
5. Make the wicker tube by using the rectangular tin sheet, with the nail and wooden groove as frames.



6. Make the wick cover to the shape of a cone with the flattened and bent tip. The wider bottom should fit well into the soft drink bottle cap.



7. Assemble the spirit lamp. Place the soft drink bottle cap upside down on top of the bottle cap and insert the wick tube through both tops. Insert the wick through the wick tube.



5. HOW TO USE

1. Remove the screw-cap of the lamp.
2. Pour spirits two-thirds full into the bottle.
3. Stuff the bottle with sufficient amount of cotton waste, taking care to insert the wick into the cotton waste.
4. Screw the cap on.
5. Remove the conical cover.
6. When the wick is sufficiently wet with spirits, light it.

PRECAUTIONS

- See that the screw cap and the bottle cap is dry – free from spirits before lighting.
- Do not carry a lighted lamp from place to place. Cover the flame with the conical cover and put the flame out before taking the lamp across the room.

Source: *"An Instruction Sheet" developed by the participants of a Regional Workshop in Educational Technology with Special Reference to Development of Low-cost Educational Materials, Kuala Lumpur, 5-15 December, 1977.*

SHEET 85

A DIVIDER

1. OBJECTIVE

To prepare a divider which can be used to measure small lengths.

2. MATERIALS USED

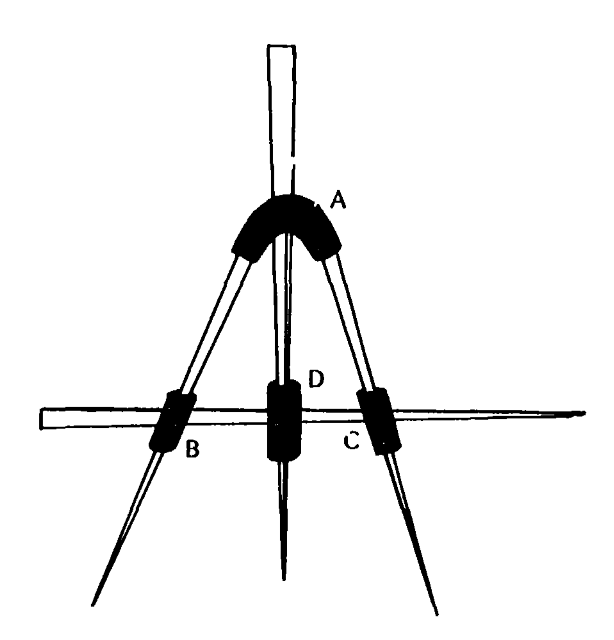
4 Babool (Acacia) thorns and 4 (1 cm long) pieces of bicycle valve tube.

3. HOW TO MAKE

1. Make a joint of two thorns with the help of a tube piece A. These form the two arms of the divider.
2. Pass another thorn through the centre of this tube piece. This is the handle of the divider.
3. See that the two points of the arms are in the same line.
4. Pass two rubber tube pieces through the two arms. The two pieces B and C should be in line with each other.
5. Now pass the fourth thorn (cross member) through the tube piece B. Take the fourth tube piece D and pass it (fourth thorn) through the cross member as shown in the diagram. Now pass the thorn through the tube in C.
6. Adjust the tube piece D of the cross member so that the end of the handle goes into this tube piece D.

4. HOW TO USE

The handle gives a three-point support. The thumb and the middle finger clutch the handle and the forefinger applies gentle pressure from the top.



Source: *"An Inventory of Low-cost/Simple Educational Materials, Games and Toys in India" prepared by Dr. M.M. Chaudhri, Head, Department of Teaching Aids, National Council of Educational Research and Training, India.*

ANNEX I

LIST OF PARTICIPANTS
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	Mr. Abdul Rahman bin Haji Abdul Ghani *Federal Inspectorate of Schools* *Ministry of Education* *Jalan Davidson* *Kuala Lumpur*

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